



**Willow Boulevard/A-Site Landfill
Operable Unit 2
Kalamazoo Township, Michigan**

*of the
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site*

Record of Decision



Prepared by
U.S. Environmental Protection Agency
Region 5
Chicago, Illinois

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RECORD OF DECISION
WILLOW BOULEVARD/A-SITE LANDFILL
OPERABLE UNIT 2
of the
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

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LIST OF ACRONYMS AND ABBREVIATIONS

AOC	administrative order on consent
ARAR	applicable or relevant and appropriate requirement
BERA	baseline ecological risk assessment
BGS	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information Systems
CFR	Code of Federal Regulations
CSM	conceptual site model
CYD ³	cubic yards
FS	feasibility study
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
mg/kg	milligram per kilogram
NHPA	National Historic Preservation Act
IRA	Interim Response Action
LOAEL	Lowest Observed Adverse Effect Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL	No Observed Adverse Effect Level
NPL	National Priorities List
NREPA	Michigan Natural Resources and Environmental Protection Act
NRT	Natural Resource Trustees
OU	operable unit
PCB	polychlorinated biphenyl
PRPs	potentially responsible parties
QAPP	quality assurance project plan
RD/RA	remedial design/remedial action
RI	remedial investigation
RI/FFS	remedial investigation/focused feasibility study
ROD	Record of Decision
RRO	remedial response objective
SARA	Superfund Amendments and Reauthorization Act
SVOC	Semi-Volatile Organic Compound
TBC	to be considered
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

PART I: DECLARATION

1.1 Site Name and Location

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Willow Boulevard/A-Site Landfill, Operable Unit 2
CERCLIS ID: MID006007306
Business I-94 and Highway M-96 (King Highway)
Kalamazoo Township, Michigan 49048

1.2 Statement of Basis and Purpose

This decision document presents the selected remedy for the Willow Boulevard/A-Site Landfill Operable Unit (OU2) located in Kalamazoo Township, Michigan. OU2 is one of four landfills associated with the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Site). The remedy for OU2 was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record file for OU2.

The State of Michigan, acting through the Michigan Department of Environmental Quality (MDEQ), concurs with the selected remedy.

1.3 Assessment of the Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 Description of the Selected Remedy

The remedial action for OU2 addresses papermaking residual, soil, and sediment contaminated with polychlorinated biphenyls (PCBs). To eliminate the risk associated with exposure to PCBs, contaminated residual, soil, and sediment (herein referred to as “PCB-contaminated material”) will be excavated from areas located outside the OU2 landfill boundary, consolidated with existing A-Site residuals, and contained under an engineered cover (cap). The sheet pile wall at the A-Site Landfill will remain in place. At the Willow Boulevard Landfill, the north side of the landfill will be excavated to create a “setback” from the Kalamazoo River. The excavated area will be backfilled with clean soil (augmented with organic substrate and plant materials) to create a new ecologically friendly dike. The dike will physically separate the landfill from the Kalamazoo River, thereby reducing the potential for PCB migration (via erosion or surface water runoff) into the river. Following dike construction, a cap will be constructed over the Willow Boulevard and the A-Site Landfills. Isolation and containment of residuals under a landfill cap

will eliminate the risk to human health and ecological receptors by removing the potential for exposure to PCBs and, reduce potential PCB migration (via erosion or surface water runoff) into adjacent areas and the Kalamazoo River. Institutional controls will be implemented to restrict public access, thereby eliminating the risk to humans by preventing exposure to contaminated residuals. Institutional controls will consist of a perimeter fence enclosing both landfills and deed restrictions limiting future land use as industrial and/or commercial. Long-term maintenance and groundwater monitoring will also be conducted to ensure the integrity and effectiveness of the landfill containment system. There is no evidence of principal threat wastes at OU2, as current monitoring data does not indicate that there is source material in the soil or groundwater.

The major components of the selected remedy for OU2 include:

- Excavation of approximately 13,800 cubic yards (cyd³) of PCB-contaminated material from areas adjacent to the Willow Boulevard and A-Site Landfills, including the Area South of the A-Site Berm, the Area East of Davis Creek, the AMW-3A area, and the Willow Boulevard Drainageway, and consolidation of that material back into the A-Site Landfill.
- Creation of a setback from the Kalamazoo River at the Willow Boulevard Landfill by excavating the northern banks of the landfill along the river, and then backfilling the excavated area with clean soil (augmented with organic substrate and plant materials) to create a new ecologically friendly dike. The setback shall be of sufficient distance to ensure that no hydraulic connection exists between the contaminated residuals within the landfill and the Kalamazoo River;
- Implementation of bank stabilization and erosion control measures to protect against bank and/or dike failure and subsequent migration of PCBs into the Kalamazoo River. In places at the A-Site Landfill where there is no sheet pile, the existing dike soils will be re-graded to achieve a gentler, stable slope, and a zone of rip-rap will be placed at the toe of the dike to prevent erosion. In places at the Willow Boulevard Landfill where no adequate dikes exist, an earthen berm will be constructed to provide a physical separation between the landfill and adjacent residences. Areas of the berm that are subject to erosion will be protected using techniques including, but not limited to, articulated concrete systems, geoweb materials, or revetment blankets;
- Construction of a cap over both the Willow Boulevard and A-Site Landfills. The cap will minimize infiltration of precipitation through the landfill, prevent potential migration of PCBs (via erosion or surface water runoff) into the Kalamazoo River, and eliminate exposure to PCB-contaminated materials. The cap shall be designed to meet the State of Michigan's solid waste landfill closure regulations pursuant to Part 115, Solid Waste Management, of the Michigan Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended;

- Long-term maintenance of the components of the remedy including the inspection (and repair, if needed) of the A-Site sheet pile wall, landfill cap, bank stabilization, and erosion control measures.
- Long-term monitoring of groundwater to ensure the integrity and effectiveness of the landfill containment system; and,
- Implementation of institutional controls to prevent exposure to PCB-contaminated material. Institutional controls will consist of access restrictions (perimeter fence with posted warning signs) and deed restrictions limiting future land use to industrial/commercial.

Other Actions Recognized Under this ROD:

- Disposal of an additional 35,000 cyd³ (approximate volume) of PCB-contaminated material into the A-Site Landfill. This material will be excavated from areas located at the Georgia-Pacific Kalamazoo Mill and the former Hawthorne Mill property, which is another operable unit associated with the Site. Excavation and transportation of contaminated materials will be conducted pursuant to a separate U.S. EPA removal action, and not as part of this ROD. The removal action, and subsequent disposal of PCB-contaminated material at the A-Site Landfill, will only occur if an Administrative Order on Consent (AOC) is successfully negotiated between U.S. EPA and Georgia-Pacific Corporation. The removal action will occur in a timeframe that will not delay implementation of this ROD.

U.S. EPA believes the remedial actions identified in this ROD, if properly implemented, will protect human health and the environment.

1.5 Statutory Determinations

The selected remedy is consistent with CERCLA, and to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), and is cost-effective. The remedy does not meet the statutory preference for treatment; however, no source material constituting principal threat wastes are present onsite. PCB-contaminated material that is present is relatively immobile and of low to moderate toxicity; and therefore, it does not constitute a principal threat waste. Because there are no principle threat wastes present at OU2, treatment is not required; rather, the NCP requires engineering controls, such as containment, for wastes that pose a relatively low long-term threat. To satisfy this requirement, PCB-contaminated material at OU2 will be physically isolated and contained under a landfill cap, and these measures will greatly reduce the mobility of the contaminated materials.

The PCB Remediation Waste Rule, 40 C.F.R. § 761.61 *et seq.*, under the Toxic Substances and Control Act (TSCA) applies to the selected remedy because some of the onsite PCB-contaminated material and material from the former paper mill properties (the Kalamazoo and Hawthorne Mills) have PCB concentrations greater than 50 mg/kg and will be disposed of at the A-Site Landfill. The Director of the Superfund Division, U.S. EPA Region 5, in consultation with TSCA, has determined that disposal of remediation waste at the A-Site Landfill will not pose an unreasonable risk of injury to human health or the environment. Through signature of this ROD, the Director of the Superfund Division, U.S. EPA Region 5, approves the risk-based disposal of PCB-contaminated material into the A-Site Landfill portion of OU2.

Because the selected remedy will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five-years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.


1.6 ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information is in the Administrative Record file for OU2.

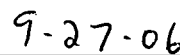
- Contaminants of concern and their respective concentrations (Section 5.5 and 5.6, pg. 14);
- Qualitative evaluation of potential risk for contaminant of concern (Section 7.2, pg. 21);
- Cleanup levels for the contaminant of concern and basis for levels (Section 7.0, pg. 20);
- Principal threat wastes (Section 11.0, pg. 39);
- Current and reasonably anticipated future land use assumptions used in the qualitative risk assessment and ROD (Section 6.0, pg. 19);
- Potential land use that will be available at OU2 as a result of the selected remedy (Section 12.4, pg. 42)
- Estimated total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 12.3, pg. 42); and
- Key factors that led to selecting the remedy (Section 12.1, pg. 40)

1.7 Authorizing Signature

The State of Michigan concurs with the selected remedy. The State of Michigan's concurrence letter is included in the Administrative Record for OU2.



Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency, Region 5



Date

PART II: DECISION SUMMARY

1.0 Site Name, Location, and Description

The Willow Boulevard/A-Site Landfill Operable Unit (OU2) is located southeast of the intersection of Business I-94 and Highway M-96 (King Highway) in Kalamazoo Township, Michigan. OU2 is bordered by the Kalamazoo River to the north and northwest, Davis Creek to the east, and Willow Boulevard Road, former Olmstead Creek, and residential areas to the south (Figures 1 and 2).

OU2 consists of two disposal areas, the Willow Boulevard Landfill (including the Drainageway area) and the A-Site Landfill. The Willow Boulevard Landfill occupies an approximate 11-acre area and the A-Site Landfill, an approximate 22-acre area. A fence exists around the southern and eastern boundary of the landfill. OU2 also includes nearby impacted areas identified in numbers (3) through (5) in the list below. Residential properties south of the Willow Boulevard and A-Site Landfills do not contain PCBs at concentrations that pose a health risk to residents and are, therefore, not part of this Record of Decision (ROD).

OU2 areas addressed in this ROD include:

- (1) the Willow Boulevard Landfill and Drainageway area;
- (2) the A-Site Landfill;
- (3) the Area East of Davis Creek;
- (4) the Area South of the A-Site berm; and,
- (5) the area near monitoring well AMW-3A.

OU2 is one of four landfills associated with the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Site) (Figure 3). The three other landfills include the Allied Paper, Inc., Landfill (OU1), the King Highway Landfill (OU3), and the 12th Street Landfill (OU4). The Site also includes 80-miles of the Kalamazoo River and a 3-mile stretch of Portage Creek (OU5); the Georgia-Pacific Kalamazoo Mill and former Hawthorne Mill properties (OU6) located in Kalamazoo, Michigan; and the Plainwell Mill property (OU7) located in Plainwell, Michigan. All operable units are in various stages of cleanup under the federal Superfund program.

The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number for the Site is MID006007306. The State of Michigan (State) was designated as the enforcement lead agency in 1990 when the Site was listed on the National Priorities List. In February 2002, U.S. EPA assumed the enforcement lead for the entire Site, with the exception of King Highway Landfill. The State will retain the enforcement lead for the King Highway Landfill. The Remedial Investigation (RI) Report for the Allied Paper, Inc., Landfill is still in draft form. After the report is finalized, U.S. EPA will draft the Feasibility Study Report for OU1.

2.0 Site History and Enforcement Activities

The Willow Boulevard and the A-Site Landfills were used to dispose of dewatered papermaking residuals from the former Allied Paper King Mill and the Georgia-Pacific Kalamazoo Mill. Figure 4 shows an aerial view of the landfills in April 2001. Both mills are located in Kalamazoo, Michigan. The paper residual consisted mostly of water, wood fiber, and clay, and PCBs were introduced into the waste stream between the 1950s and 1970s. During this time, the paper mills were recycling office wastepaper, some of which contained carbonless copy paper contaminated with PCBs. Process residuals from the recycling operations were then disposed of at the Willow Boulevard and at the A-Site Landfills. Over time, the contaminated residuals migrated, via erosion or surface water runoff, from the landfill into adjacent areas and/or the Kalamazoo River. Summarized below is a description of the operating history of each landfill.

The A-Site was originally a series of dewatering (or drainage) lagoons. Paper waste from the King Mill was piped to the A-Site lagoons, and water was allowed to settle out. Paper residuals accumulated within the lagoons, and over time, the A-Site became known as the A-Site Landfill. The A-Site lagoons were active between 1960 and 1967. Operations at the King Mill ended in 1971, and the mill was razed in 1978. Georgia-Pacific purchased the A-Site in 1975 and used it to dispose of paper waste dug up from the King Highway dewatering lagoons until 1977. The King Highway dewatering lagoons were located at the Georgia-Pacific Kalamazoo Mill property, just north of OU2 across the Kalamazoo River. From 1977 to 1987, the A-Site received dewatered papermaking waste from the Kalamazoo Mill filter presses. The A-Site ceased to be an active disposal area in 1987, when the King Highway Landfill operations began. In late 1998, a sheet pile wall was installed at the A-Site Landfill along the length of the Kalamazoo River, extending about 150 feet up Davis Creek. This wall extends 2 feet above the 100-year flood elevation. The purpose of the sheet pile was to reduce the potential for residuals to be transported into the river in the event of failure of the existing dikes.

The Willow Boulevard Landfill was acquired by Georgia-Pacific from the Kalamazoo Paper Company in 1967. From mid-1960 until 1975, dewatered paper residuals were disposed of at the Willow Boulevard Landfill. The Willow Boulevard Landfill, which was built without berms, also received dewatered residuals from the King Highway lagoons. Disposal activities occurred from the mid 1960's until operations stopped in 1975. The paper waste from the Kalamazoo Mill contained clay, paper fibers and PCBs. In April 1999, Georgia-Pacific began implementation of an interim response program at the Willow Boulevard Landfill. Interim response activities include the excavation of residual areas along the western bank of the river adjacent to the landfill and placing the material in the eastern portion of the landfill; re-grading the landfill to promote proper drainage; and placing a 6-inch layer of clean sand on top of the landfill. A portion of the river edge was backfilled to create a sand berm along the Kalamazoo River. Geotextile and riprap were placed along the river's edge to reduce erosion.

OU2 was placed on the National Priorities List (NPL) in 1990. In 1990, the State entered into an Administrative Order on Consent (AOC) with HM Holdings, Inc., Georgia-Pacific Corporation, and the Simpson Plainwell Paper Company (no longer a potential responsible party (PRP) at the

Site due to bankruptcy). In accordance with the AOC, the PRPs developed the remedial investigation/focused feasibility study (RI/FFS) report for OU2. In 2001, the State rejected the PRP's RI/FFS and took over the completion of the report. The State completed the OU2 RI and FFS reports in November 2004. The State also conducted the human health and ecological risk assessments, and published the reports in April 2003. U.S. EPA officially acquired the enforcement lead of OU2 upon the Michigan Department of Environmental Quality's (MDEQ) completion of the RI/FFS. Georgia-Pacific Corporation, under a federal consent decree, will carry out the design and implementation of the remedy selected in this ROD.

3.0 Community Participation

The RI/FFS and Proposed Plan for OU2 were made available to the public on July 15, 2005. Copies of the Proposed Plan were mailed to all interested persons on the U.S. EPA community involvement mailing list for OU2. Copies of all documents supporting the selected remedy outlined in the Proposed Plan are in the Administrative Record file for OU2, located at the U.S. EPA Records Center, 77 West Jackson Boulevard, Chicago, Illinois. Copies of all supporting documents were also placed in the Information Repositories at the Kalamazoo Public Library, Western Michigan's Waldo Library, and at the libraries in Plainwell, Otsego, Allegan, and Douglas, Michigan. The notice of the availability of these documents and the date of the public meeting was published in the Kalamazoo Gazette on July 26, 2005. The public comment period began on July 15, 2005, and concluded on August 15, 2005. The public meeting was held at the Kalamazoo Public Library on August 3, 2005. A request to extend the comment period was made during the public meeting. The comment period was extended to September 16, 2005. A notice of the extension was published in the Kalamazoo Gazette on August 14, 2005, and in the Allegan County News on August 18, 2005. Responses to comments received during the public comment period and at the public meeting are included in the Responsiveness Summary, in Part III of this ROD.

4.0 Scope and Role of Response Action

Operable Unit 2 is part of an overall cleanup of the Site that includes seven identified OUs. The cleanup status of each OU is summarized in Table 1 below.

Table 1 - Cleanup Status of OUs at the Allied Paper Inc/Portage Creek/Superfund Site

Operable Unit	Name	Cleanup Status
OU1	Allied Paper, Inc. Landfill	The Remedial Investigation Report is still in draft form. After the report is finalized, U.S. EPA will draft the Feasibility Study Report.
OU2	Willow Boulevard/A-Site Landfill	Subject of this ROD

OU3	King Highway Landfill	ROD signed in February 1998. MDEQ will retain the lead on oversight of operation and maintenance activities.
OU4	12 th Street Landfill	ROD signed in September 2001. EPA is overseeing the remedial design phase of the remedy, which is now underway.
OU5	80-miles of the Kalamazoo River & a 3-mile stretch of Portage Creek	U.S. EPA, MDEQ, the PRPs, and the Natural Resource Trustees are engaged in mediated negotiations.
OU6	Georgia-Pacific Kalamazoo Mill and former Hawthorne Mill Properties	U.S. EPA is preparing the legal documentation for a Time-Critical Removal Action at OU6. Under this action, approximately 35,000 cyd3 of PCB-contaminated materials will be excavated from the former mill properties and disposed of at the A-Site Landfill portion of OU2.
OU7	Plainwell Mill Property	U.S. EPA will oversee the Remedial Investigation/Feasibility Study, expected to begin in the Fall of 2006.

The overall cleanup strategy for the Site is to eliminate on-going sources of PCBs into the Kalamazoo River, and to reduce or eliminate the risk to human health and the ecological receptors from exposure to PCBs via dermal contact, ingestion, and inhalation of airborne PCB-contaminated material, and through the consumption of Kalamazoo River fish. The ROD for OU2 will be consistent with the final remedy for the overall Site.

OU2 is being addressed under the framework set forth in CERCLA. The selected remedy for OU2 addresses papermaking residual, soil, and sediment contaminated with PCBs, and it will reduce or eliminate the risk to human health and ecological receptors by removing potential exposure to PCB-contaminated material by removing, consolidating, and containing contaminated materials under a landfill cap. The selected remedy will also eliminate potential migration of PCBs from the landfills and adjacent areas (via erosion or surface water runoff) into the Kalamazoo River, thereby eliminating potential risks to fish-eating consumers (people or mink).

5.0 Site Characteristics

5.1 Conceptual Site Model

The conceptual site model (CSM) provides an understanding of OU2 based on the sources of the contaminants of concern, potential transport pathways, and environmental receptors. Based on the nature and extent of the contamination and the fate and transport mechanisms described in the RI Report, the CSM for OU2 includes the following components:

- PCBs are the primary contaminants of concern. PCBs entered the waste stream when the former King Mill and Kalamazoo Mill recycled office waste paper, some of which contained carbonless copy paper contaminated with PCBs;
- PCB-contaminated residual is present in surface and/or subsurface soil at the landfills and adjacent areas. At the landfills and the adjacent areas, the pathway of concern is via dermal contact with exposed residuals and the transport of contaminated material into the Kalamazoo River via erosion or by surface water runoff;
- PCB transport within air, during the RI and interim response action activities, did not represent a significant pathway based on the results of air monitoring conducted;
- Primary PCB transport mechanism at the Willow Boulevard Landfill is via erosion of residuals from the landfill and/or surface water runoff of soil and sediment from adjacent areas into the Kalamazoo River. At the A-Site Landfill, PCB transport into the Kalamazoo River is limited due to the presence of the existing sheet pile wall and the perimeter dike. PCB transport (via erosion and surface water runoff) at the A-Site Landfill is primarily associated with areas located outside the sheet pile wall and perimeter dike such as the Area South of the A-Site Berm. Migration of PCBs into the Kalamazoo River is a pathway of concern for humans and aquatic ecological receptors, such as mink, that uptake PCBs through the consumption of fish;
- Fate and transport of PCBs within the landfills is limited due to the low permeability of the residual waste material; however, native soils surrounding residual waste material are permeable and may provide a pathway to the Kalamazoo River;
- Suspension and migration of PCBs may be associated with surface water flow in Davis Creek and the Kalamazoo River;
- During the RI, PCBs were detected in one (WMW-3A) of the five groundwater monitoring wells sampled at the Willow Boulevard Landfill. However, it was later determined that past detections of PCBs at WMW-3A may be an artifact of well construction. During the RI, no PCBs were detected in groundwater samples collected at the A-Site Landfill in 1993 and 1995. However, PCBs were detected in leachate wells that were installed within a perched saturated zone at the A-Site Landfill. PCBs

were also detected in groundwater samples collected from the A-Site Landfill in November and December 2000; and,

- Although several metals were detected in groundwater at OU2, none were detected above their respective State Groundwater Surface Water Interface (GSI) value with the exception of barium and mercury.

5.2 Site Overview

OU2 is approximately a 32-acre site that consists of two disposal areas and nearby impacted areas. The A-Site Landfill occupies an approximate 11-acre area while the Willow Boulevard Landfill (including the Drainageway), occupies approximately 22-acres. The acreage of the nearby impacted areas is summarized in Table 4. Georgia-Pacific owns the Willow Boulevard Landfill and Drainageway area, the A-Site Landfill, the Area South of the A-Site Berm (including former Olmstead Creek), and the Area East of Davis Creek. The Kalamazoo Township owns the area near monitoring well AMW-3A. The Willow Boulevard and A-Site Landfills are bordered by the Kalamazoo River to the north and northwest, Davis Creek to the east, and Willow Boulevard Road, former Olmstead Creek, and residential homes to the south.

OU2 lies within the Galesburg-Vicksburg Outwash Plain. The regional geology in the vicinity of OU2 consists of unconsolidated glacial deposits overlying consolidated bedrock formations. The generalized OU2 geology consists of the following, starting at ground surface: layer of residuals; discontinuous organic-rich peat unit; a fine to coarse sand and/or fine sandy permeable glacial outwash materials; and shale bedrock. Groundwater within the Kalamazoo River Basin flows from topographic high areas to lowland discharge areas. High water tables or levels occur in spring and low groundwater levels occur in the summer.

No private, commercial, or industrial water wells were identified within 1/4-mile of OU2. Ten wells were identified within 1/2-mile of OU2. Six of the ten wells are located north of OU2, across the Kalamazoo River. Four of the six wells are public water supply wells owned by the City of Kalamazoo. Of the remaining two of the six wells, one is an industrial well and the other is a domestic well. The four remaining wells, of the original ten identified, are located to the south and east of OU2. Of the four wells, three are domestic wells. The type of usage for the last remaining well is unknown since no reported usage could be found in any of the available well records. It is not known whether any of the domestic wells within 1/2-mile of OU2 are being used for drinking water. Figure 5 depicts water well locations within a 1/4- mile and 1/2- mile of OU2.

Land use in the vicinity of OU2 includes industrial, commercial, and residential property. OU2 is currently an inactive disposal area. The A-Site Landfill area is zoned for industrial use. The Willow Boulevard Landfill area has never been zoned because the Willow Boulevard Landfill did not exist at the time the A-Site Landfill area was zoned. The land south of OU2 is zoned residential.

Wetlands are present along OU2 and have been identified in *Technical Memorandum 9* (BBL, 1995b). Several types of wetlands were identified and classified as palustrine unconsolidated bottom semi-permanently flooded, palustrine deciduous forest subject to seasonal flooding, and palustrine emergent semi-permanently flooded. OU2 provides “moderate quality” habitat for terrestrial wildlife. There is “high quality” habitat adjacent to OU2.

5.3 Sampling Strategy

The PRP conducted pre-RI sampling and later conducted additional extensive OU2 investigations as part of the remedial investigation work. The purpose of the pre-RI sampling was to identify specific areas to target for investigation during the RI. Pre-RI samples were collected with oversight of the Michigan Department of Natural Resources (MDNR). Pre-RI investigations between 1986 and 1990 include:

- Surficial Residuals and Soils Investigation;
- Subsurface Residuals and Soils Investigation;
- Groundwater Investigation; and,
- Air Investigation.

Pre-RI investigation activities are described in detail in the *July 1992, Description of Current Situation Report* prepared by Blasland, Bouck & Lee, Inc (BB&L). Table 2, below, summarizes the areas sampled, the media investigated, and the analytical parameters used during the pre-RI.

Table 2 - Pre-RI Areas Sampled, Media Investigated, and Analytical Parameters

Areas Sampled	Media Investigated	Analytical Parameters
Willow Boulevard Landfill	Surface Residual & Subsurface Residual	PCBs
	Groundwater	PCBs and dioxin
A-Site Landfill	Surface Soil, Subsurface Soil & Groundwater	PCBs
Area East of Davis Creek	Surficial Residual	PCBs
Davis Creek	Surface Water	PCBs
former Olmstead Creek	Surface Water	PCBs
Residential Property South of Willow Boulevard Landfill	Surface Soil	PCBs

Because the quality of the historical pre-RI data could not be verified through a Quality Assurance/Quality Control (QA/QC) review, pre-RI sampling data cannot be used for decision-making purposes.

The purpose of the RI sampling was to characterize areas that were sampled during the pre-RI and to investigate new areas. New areas investigated during the RI include residential properties south of the A-Site Landfill and the area near monitoring well AMW-3A. During the RI, samples were collected from 97 soil borings and 28 groundwater monitoring wells. Air samples were collected from one perimeter and two background air samplers. Additionally, 16 sediment cores and 8 surface water samples were collected from Davis Creek, the former Olmstead Creek, and the Kalamazoo River. RI samples were collected with oversight of the MDEQ. RI investigations between 1993 and 2000 include:

- Residual characterization;
- Hydrogeological investigation;
- Soil and sediment investigation;
- Geotechnical investigation;
- Surface water investigation;
- Air investigation; and,
- a Wetlands assessment.

RI investigations were conducted in accordance with the following documents:

- MDEQ-approved *Work Plan* authored by Blasland & Bouck Engineers, PC (BBEPC, 1993b);
- *Work Plan Addendum* (BBL, 1995c);
- *Field Sampling Plan* (BBEPC, 1993c);
- *Quality Assurance Project Plan* (BBEPC, 1993d); and,
- Plans for additional sampling of the AMW-3A area and the Willow Drainageway area, and a residential soil sampling plan (Brown, 1998a; Brown 1998b; McGuire, 1998a; McGuire, 1998b; McGuire, 1999).

Table 3, below, summarizes the areas sampled during the RI, the media investigated, and the chemicals analyzed.

Table 3 - RI Areas Sampled, Media Investigated, and Analytical Parameters

Areas Sampled	Media Investigated	Analytical Parameters
Willow Boulevard Landfill	Surface Residual	PCBs and dioxins
	Subsurface Residual	PCBs, VOCs, SVOCs, pesticides and metals
	Groundwater	PCBs, VOCs, SVOCs, pesticides and metals
Willow Boulevard Drainageway Area	Subsurface Soil/Sediment	PCBs

A-Site Landfill	Surface Residual	PCBs and dioxins
	Subsurface Residual	PCBs, VOCs, SVOCs, pesticides and metals
	Groundwater	PCBs, VOCs, SVOCs, pesticides and metals
North of A-Site Landfill in the Kalamazoo River	Sediment	PCBs
Area South of A-Site Berm	Surface Soil	PCBs
	Subsurface Soil	PCBs and dioxin
Davis Creek	Surface Water and Sediment Samples	PCBs
Former Olmstead Creek	Surface Water	PCBs
Area East of Davis Creek	Surficial Residual	PCBs
Area Near Monitoring Well AMW-3A	Surface & Subsurface Soil	PCBs
Residential Property South of Willow Boulevard Landfill	Surface Soil	PCBs
Residential Property South of the A-Site Landfill	Surface and Subsurface Soil	PCBs

Between November 1999 and April 2000, Georgia-Pacific voluntarily conducted interim response actions (IRAs) at both landfills in accordance with the *Residual Removal Work Plan* outlined in a letter to MDEQ (McGuire, 1999). The purpose of the IRAs was to remove PCB-contaminated residuals that had eroded from the landfills and deposited into the Kalamazoo River, and to prevent future erosion and mobilization of residuals into the River. At the Willow Boulevard Landfill, residuals were excavated from the river and relocated back into the landfill. Confirmatory samples were collected prior to backfilling the excavation area with clean sand. A temporary berm was also constructed along edge of the river and a 6-inch sand layer was placed over the landfill. Erosion control measures (riprap and geotextile) were installed. Burrowing animals and erosion continue to diminish the effectiveness of the IRA. In areas where the sand layer/geotextile is disturbed, residuals are visibly eroding into the Kalamazoo River. At the A-Site Landfill, residuals from the confluence of the former Olmstead Creek and the Kalamazoo River were excavated, confirmatory samples collected, and the area backfilled with clean material. Approximately 7,000 cyd³ of PCB-contaminated sediment was removed during this IRA. Confirmatory sampling results are summarized in Section 5.6 of this ROD. Any PCB-containing material remaining in the Kalamazoo River will be addressed as part of the ROD for OU5.

5.4 Source of Contamination

As discussed in Section 2.0 of this ROD, PCB-contaminated paper residuals at OU2 originated at the former Allied Paper King Mill and the Georgia-Pacific Kalamazoo Mill. These mills recycled office waste paper, some of which contained PCB-containing carbonless copy paper. The processed residuals, from the recycling operations, were then disposed of at the Willow Boulevard and the A-Site Landfills. Over time, PCB-contaminated residuals from the landfills eroded and migrated into the soil and sediment of adjacent areas and/or into the Kalamazoo River. Surface water runoff from the landfills and possibly adjacent areas may also transport PCBs directly into the Kalamazoo River. Therefore, the landfills and adjacent areas may be sources of PCBs to the Kalamazoo River and Davis Creek, which empties into the Kalamazoo River.

5.5 Types of Contaminants and Affected Media

PCBs are the primary contaminant of concern at OU2. The media of concern are PCB-contaminated residuals within the Willow Boulevard and A-Site Landfills and PCB-contaminated residual, soil, and/or sediment in areas adjacent to the landfills including the Willow Drainageway, the Area South of the A-Site Berm, the Area East of Davis Creek, and the area near monitoring well AMW-3A. Groundwater has not been fully investigated, but groundwater quality results obtained thus far have shown detectable concentrations of PCBs and metals in groundwater. PCBs are the primary risk driver at OU2. U.S. EPA classifies PCBs as a probable human carcinogen.

5.6 Extent of Contamination

This section briefly describes pre-RI and RI sampling activities and results conducted at OU2. Figure 6 depicts pre-RI sample locations, and Figures 7 through 10 depict supplemental RI sample locations and results. A full description of the pre-RI investigation and sampling results are contained in the July 1992 *Description of Current Situation* report prepared by BB&L. A full description of RI investigations and sampling results are included in the November 2004 *Remedial Investigation Report*, which was prepared by the MDEQ. Both reports are included in the Administrative Record for OU2.

Volume Estimates

During the RI and supplemental investigations, samples were collected from soil borings to characterize the vertical and horizontal extent of the PCB-contaminated material that is present within the landfills and adjacent areas. Field observations of gray clay material and analytical data were used to estimate the volume of PCB-contaminated material. Volumes were calculated based on PCB concentrations in residual waste material exceeding the laboratory detection limit for PCBs of 0.33 mg/kg. Estimated volume of PCB-contaminated material at OU2 is summarized in Table 4, below. Actual removal volume may vary depending on the cleanup level that is appropriate for those areas.

Table 4 – Estimated Volume of PCB-Contaminated Material at OU2

Areas	Size	Maximum Depth	Estimated Volume (cyd³)
Willow Boulevard Landfill (& Willow Drainageway)	11 Acres	24 ft (residual)	152,100
A-Site Landfill	22 Acres	29 ft (residual)	475,400
East of Davis Creek	3.5 Acres	< 1 ft (residual)	3,800
South of A-Site Berm (includes former Olmstead Creek)	2.5 Acres	6 ft (soil and sediment)	2,900
AMW-3A Area	0.25 Acres (Not Fully Defined)	1 ft (soil)	100

Willow Boulevard Landfill**Pre-RI Sampling**

Pre-RI samples collected by the Michigan Department of Natural Resources (MDNR) in 1986 reported total PCB concentrations of 44 mg/kg and 47 mg/kg in two surficial soil samples (0 to 2 feet below ground surface (bgs)). Pre-RI surficial samples collected by Georgia-Pacific in 1987 and 1988 reported total PCB concentrations ranging from non-detect to 330 mg/kg. Subsurface sampling (greater than 2 ft bgs) conducted by MDNR and Georgia-Pacific in 1987 and 1988 ranged from non-detect to 160 mg/kg PCB, and having an average of approximately 65 mg/kg PCB. Groundwater sampling of three wells in February and March 1988 had total PCB concentrations ranging from non-detect to 1.4 ug/L, with an average concentration of 0.28 ug/L. In June 1990, groundwater sampling of the same three wells were analyzed for PCDD and PCDF homologues and 2,3,7,8-congeners. At one well, the total PCDF result was 0.00002 ug/L; the remainder of the samples resulted in non-detect or returned results in test blanks, as well as sample media.

RI Sampling

During the RI, PCBs were detected in 8 of 9 surface soil samples, ranging from non-detect to a maximum concentration of 270 mg/kg, with an average of 68 mg/kg. These samples were collected prior to the installation of the temporary sand cover. However, Photograph 1, taken by the MDEQ, shows a large tear in the geofabric and gray paper residuals visibly eroding into the Kalamazoo River. Sampling of subsurface residuals showed PCBs detected in 38 of the 42 samples, ranging from non-detect to a maximum concentration of 160 mg/kg (4 to 6 ft bgs), with an average concentration of 34 mg/kg. Of the 15 subsurface samples analyzed, none of the samples exceeds regulatory criteria for Volatile Organic Compounds (VOCs), Semi Volatile Organic Compounds (SVOCs), or pesticides. Five metals (mercury, cyanide, manganese, zinc,

and lead) were detected in subsurface soil exceeding the State of Michigan industrial/commercial criteria for the protection of groundwater. Of the three surface soil samples collected for dioxin analysis, none of the samples exceeds any applicable regulatory cleanup criteria. Sample results for dioxins ranged from 0.000002 mg/kg to 0.0008 mg/kg, which is below applicable regulatory cleanup criteria. In October 1993 and August 1995, groundwater samples were collected from monitoring well WMW-3A and analyzed for PCBs. PCBs were detected above the method detection limit in one of five groundwater samples in October 1993 and in one groundwater sample collected in August 1995. The PRP suspected that PCBs detected in the groundwater samples could be attributable to artifacts of well installation. To test this hypothesis, in August 1996, a double-cased replacement well was installed in close proximity to WMW-3A. The new replacement well (WMW-3AR) was sampled twice (August 1996 and November 2000) and no PCBs were detected above method reporting limits. These results support the hypotheses that past detections of PCBs at monitoring well WMW-3A may be an artifact of well construction.

Interim Removal Action

Twenty-one confirmatory sediment samples were collected from the Kalamazoo River, adjacent to the Willow Boulevard Landfill, and analyzed for PCBs. Samples collected by the PRP ranged from non-detect (at the surface) to 0.73 mg/kg (at base of excavation). Samples collected by MDEQ ranged from 0.05 mg/kg (surface) to 2.7 mg/kg (at base of excavation). As discussed in Section 5.3 of this ROD, any PCB-containing material remaining in the Kalamazoo River will be addressed as part of the remedy for OU5.

Willow Drainageway:

No pre-RI samples were collected; only subsurface samples were collected during the RI. Subsurface PCB concentrations ranged from not detected to 30 mg/kg (6.5 - 7.0 ft bgs).

A-Site Landfill:

Pre-RI sampling

Pre-RI surficial residual samples were collected in April 1987. PCB concentrations in surface residuals (at the east end of the A-Site) ranged from non-detect to 2 mg/kg. PCB concentrations in subsurface residuals ranged from non-detect to 15 mg/kg (24 to 26 ft bgs).

RI sampling

PCB concentrations in surficial residuals ranged from non-detect to 0.12 mg/kg. However, Photograph 2, taken by the MDEQ, shows paper residuals exposed at the surface of the landfill. PCB concentrations in subsurface samples ranged from non-detect to 330 mg/kg (22 to 24 ft bgs). None of the 17 subsurface samples analyzed for VOCs, SVOCs, or pesticides exceed any regulatory cleanup criteria. Of the 17 samples analyzed for metals, only mercury was detected at concentrations exceeding State criteria for the protection of groundwater. Eight sediment samples were also collected on the north side of the A-Site Landfill outside the sheet pile wall. PCB concentrations in these samples ranged from non-detect to 0.14 mg/kg. PCBs were not detected in groundwater samples collected at the A-Site Landfill in October 1993 and in August 1995. However, PCBs were detected in leachate wells that were installed within a perched

saturated zone. PCB concentrations ranged from non-detect to an estimated 0.18 ug/L in groundwater samples collected from the A-Site Landfill in November and December 2000.

Interim Removal Action

Confirmatory sediment samples were collected from the Kalamazoo River at the confluence of Olmstead Creek and the River. Samples collected by the PRP ranged from non-detect to 0.75 mg/kg PCB. Confirmatory samples collected by MDEQ ranged from non-detect to 14 mg/kg PCB. As discussed in Section 5.3 of this ROD, any PCB-containing material remaining in the Kalamazoo River will be addressed as part of the remedy for OU5.

Area South of the A-Site Berm:

No pre-RI samples were collected. PCB concentrations in three surface samples ranged from non-detect to 0.77 mg/kg. An additional surficial sample was collected in a subsequent round of sampling. PCB concentration in this sample was 14 mg/kg. Of the 9 subsurface samples collected, 9 had PCB concentrations ranging from 0.36 to 37 mg/kg (4 to 4.8 ft bgs). All other samples were reported as non-detect.

Davis Creek:

During the pre-RI, one split sample of surface water was collected, and during the RI, three sediment samples were collected. No PCBs were detected in the surface water sample collected by the MDNR in April 1987. PCB concentrations in sediment samples ranged from 0.054 mg/kg to 0.12 mg/kg.

Former Olmstead Creek:

During the pre-RI, three sediment samples were collected; during the RI, three surface water samples were collected. Three sediment samples collected had PCB concentrations of 9.94 mg/kg, 0.31 mg/kg (7.6 mg/kg in a duplicate sample), and 1.5 mg/kg. The sample location (OCD-SED) which had the PCB concentration of 9.94 mg/kg was removed during the IRA discussed in Section 5.3 of this ROD. No PCBs were detected in any of the surface water samples.

Area East of Davis Creek:

During the pre-RI, 11 surficial residual samples were collected and during the RI, an additional 8 surficial samples were collected. Pre-RI concentrations in surficial residuals ranged from non-detect to 5 mg/kg PCB. One triplicate sample, collected by the MDNR, had a concentration of 80 mg/kg PCB. During the RI, PCB concentrations in surficial residuals ranged from non-detect to 36 mg/kg. Since residuals are primarily located within the top two feet of soil, no samples deeper than two feet bgs were collected. The extent of contamination has not been fully defined and shall be addressed during remedial design of the selected remedy.

AMW-3A Area:

No pre-RI samples were collected. In January 1998, 21 samples were collected as part of the RI from 4 locations adjacent to monitoring well AMW-3A. PCB concentrations in surficial

samples (0 to 2 ft bgs) ranged from 0.84 mg/kg to 3.5 mg/kg and in subsurface samples, PCB concentrations ranged from 0.94 mg/kg to 62 mg/kg (5.5 to 6.0 ft bgs). In July 1998, an additional 22 samples were collected from 7 locations. Four of the 7 locations were 20 to 40 feet from the original January 1998 locations. PCB concentrations in surficial soil samples collected at these locations ranged from non-detect to 2.9 mg/kg. In subsurface samples, PCB concentrations ranged from non-detect to 19 mg/kg PCB (3 to 4 ft bgs). Two of the seven locations sampled are north of AMW-3A, adjacent to the Wright property, but on land owned by Georgia-Pacific. Maximum PCB concentration in surface soil at this location was 3.1 mg/kg (0 to 2 ft bgs), and in subsurface soil, the maximum concentration was 61 mg/kg PCB (2 to 4 ft bgs) near SB-3A-103. The remaining location south of AMW-3A, adjacent to the Bloomfield property but on land owned by Georgia-Pacific, had a PCB concentration of 3.1 mg/kg in surface soil and 1.1 mg/kg in subsurface soil. In March 1999, 24 samples were collected from 6 locations to the north and south of the AMW-3A area. Surficial PCB concentrations ranged from non-detect to 5.9 mg/kg and subsurface PCB concentrations ranged from non-detect to 1.7 mg/kg (2 to 4 ft bgs).

Residential Property South of Willow Boulevard Landfill:

In 1987, the Michigan Department of Public Health (MDPH) collected pre-RI surface soil samples at 19 locations as a result of resident concerns regarding flooding in the Lakewood neighborhood. Only one sample had a PCB concentration of 0.08 mg/kg and was considered by the MDPH not to pose a threat to public health. In 1999, Georgia-Pacific collected subsurface samples during the RI. No PCBs were detected in any of the subsurface samples.

Residential Property South of A-Site Landfill:

No pre-RI samples were collected. During the RI, surface and subsurface soil samples were collected at residential properties including the Wright, Bloomfield, Adkins, Wadsworth, and Scott properties. All soil samples were below the State residential cleanup criteria of 4.0 mg/kg.

Wright Property

No PCBs were detected in any of the three surface soil samples collected. One sample, from a boring taken on the Wright property, had a PCB concentration of 4.4 mg/kg. However, the property where this sample was taken was on land owned by Georgia-Pacific. The fence line was relocated and there is now a barrier between the Wright property and the sample location.

Bloomfield Property

Four surface and eight subsurface soil samples were collected from four soil borings. Two of the four surface samples had PCB detections ranging from 0.14 to 1.5 mg/kg, which are below the residential criterion of 4.0 mg/kg. The two remaining surface samples and the eight subsurface samples were all reported as non-detect.

Adkins Property

Nine surficial samples were collected from nine borings. One sample had a PCB concentration of 0.14 mg/kg (estimated). All other samples were reported as non-detect. Of the 37 subsurface

samples collected from 9 borings, PCB concentrations ranged from non-detect to 1.0 mg/kg, which is below the residential criterion.

Wadsworth Property

No PCBs were detected in any of the six surficial samples collected at three soil borings on this property. PCB concentrations in three subsurface samples collected from two borings ranged from non-detect to 0.12 mg/kg, which is below the residential criterion.

Scott Property

Fifteen test pits were dug, and two surficial soil samples were collected to determine the extent and nature of gray materials observed on the property. PCB concentrations in the two surficial soil samples were reported as non-detect. No PCBs were detected in any of the four subsurface samples collected.

6.0 Current and Potential Future Land and Resource Uses

Current land use near OU2 is industrial, commercial, and residential. The Willow Boulevard and A-Site Landfills are inactive disposal areas. The A-Site is zoned for industrial use. When the A-Site was zoned, the Willow Boulevard Landfill did not exist; and therefore, it was not zoned. If the Willow Boulevard Landfill was zoned today, it would likely be zoned industrial based on a record review indicating 40 years of prior industrial land use. The land adjacent to and south of OU2 is zoned residential. Future land use is expected to remain industrial at the landfills and residential to the south based on a review of current and historical use of the property and zoning maps.

OU2 is located adjacent to the Kalamazoo River. The Kalamazoo River is used for recreational purposes (e.g., swimming, boating, and fishing). River water is not used as a drinking water source and is not expected to be used as a drinking water source in the future. All properties within the City of Kalamazoo limits are connected to the City of Kalamazoo's public water supply. The City draws its water from four municipal wells located within a ½ mile north of OU2. There are however, four domestic wells and one industrial well, located within a ½ mile of OU2. Three of the domestic wells were plugged and are no longer being used. No records exist for the fourth well and it is not known whether this well is being used for drinking water.

7.0 Summary of Site Risk

The Michigan Department of Environmental Quality (MDEQ) completed a Site-wide *Final (Revised) Human Health Risk Assessment* and *Baseline Ecological Risk Assessment* for the entire Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. The Human Health Risk Assessment (HHRA) quantitatively assessed potential risks to human health for different exposure pathways including the consumption of fish, direct contact with contaminated floodplain soils, and inhalation of dust and volatile emissions from floodplain soils behind the State-owned dams. The HHRA concluded the most significant exposure pathway is the consumption of fish from the river because fish bioaccumulate PCBs from exposure to PCB-

contaminated material, surface water, and prey. Recreational activities, including swimming, boating, and wading the river, do not pose a health risk to people. The Baseline Ecological Risk Assessment (BERA) concluded that sensitive piscivorous consumers, such as mink, are the most at risk compared to other representative ecological receptors. Omnivorous birds (represented by the robin) that consume a substantial amount of earthworms are also at significant risk if foraging takes place in contaminated areas, and terrestrial mammals (represented by the red fox) may be at some risk if foraging is concentrated in riparian areas whose prey reside in contaminated areas and have taken up substantial amounts of PCBs.

For OU2, no quantitative risk assessment was performed. Instead, potential risks associated with exposure pathways at OU2 were qualitatively assessed to determine which media would need to be targeted for remediation and/or environmental controls.

Exposure pathways assessed include ingestion of and dermal contact with contaminated residual, soil, and sediment; inhalation of airborne releases; and erosion into aquatic habitat. Media evaluated include air, surface soils, residuals and sediment, subsurface soils, surface water, and groundwater/leachate. Potential risks associated with exposure pathways were qualitatively assessed by comparing maximum PCB concentrations detected in the RI with cleanup criteria based on future land use and protective ranges established in the BERA and the HHRA. Cleanup criteria used in the qualitative assessment of potential risk at OU2 include:

- Generic Commercial II and Industrial Land Criteria of 16 mg/kg PCBs (soil) protective of human health for onsite workers and/or trespassers, established under Part 201, Environmental Remediation of the Natural Resources and Environmental Protection Act, PA 451 of 1994, as amended, and Part 201 Administrative Rules;
- Generic Residential Land Use Criteria of 4 mg/kg PCB (soil) protective of human health for residential land-use, established under Part 201, Environmental Remediation of Natural Resources and Environmental Protection Act, PA 451 of 1994, as amended, and Part 201 Administrative Rules;
- The No Observed Adverse Effect Level (NOAEL) to Lowest Observed Adverse Effect Level (LOAEL) range of 6.5 mg/kg to 8.1 mg/kg PCB in soil and/or sediment for the protection of terrestrial ecological receptors (the American Robin) as established in the BERA; and
- The HHRA sediment cleanup criteria protective of people consuming fish range of 0.04 mg/kg to 0.30 mg/kg PCB; however, because MDEQ has a detection limit of 0.33 mg/kg for PCBs, the cleanup criteria protective for people consuming fish defaults to the 0.33 mg/kg.

This section of the ROD summarizes the results of the qualitative evaluation of potential risks to human health and ecological receptors at OU2. In accordance with U.S. EPA guidance on preparing RODs, the information presented here focuses on the information that is driving the need for the response action and does not necessarily summarize the results of the Site-wide

BERA report or the methods used in Act 451 Part 201 to calculate protective cleanup levels for a particular land use. Further information is contained in the documents titled, *Final (Revised) Human Health Risk Assessment (April 2003)*, *Final (Revised) Baseline Ecological Risk Assessment (April 2003)* and *Remedial Investigation/Focused Feasibility Study Report (November 2004)*. State of Michigan Generic Cleanup Criteria under Public Act 451, Part 201 (Environmental Response) of the Natural Resource and Environmental Protection Act can be found at www.michigan.gov/deq. These documents are also included in the Administrative Record for OU2.

7.1. Identification of Contaminants of Concern

PCBs are the primary contaminant of concern and the risk driver at OU2. The primary media of concern are residual, soil, and sediment.

7.2 Summary of Qualitative Assessment of Potential Risks to Human Health and Ecological Receptors

The qualitative assessment of risk to human health and ecological receptors is summarized below. Current and future land-use of OU2 areas were considered in the determination of whether an area poses an actual or potential risk to human health. Areas zoned industrial or areas not zoned but likely to remain industrial were evaluated with respect to the State's health-based soil criteria for industrial/commercial land use. Areas zoned residential were evaluated with respect to the State's health-based soil criteria for residential land use. For all areas, risks to ecological receptors were evaluated with respect to ranges established in the BERA for the protection of ecological receptors.

Technical Memorandum 9 identifies wetlands at OU2. The wetlands identified include a small portion of the Willow Drainageway, the Area South of the A-Site Berm, the former Olmstead Creek, and the Area East of Davis Creek. Wetland areas will be further evaluated during the remedial design phase of the remedy. During the remedial design phase of the remedy, a scientifically valid indicator of wetland inundation period will be established in order to determine where a sediment-to-fish-to-consumer exposure pathway in OU2 wetland areas presents an unacceptable risk to consumers (people or mink) of fish. If, after applying the inundation period indicator to a wetland area a sediment-to-fish-to-consumer exposure pathway is determined to present an unacceptable risk to consumers of fish, then the more conservative aquatic sediment criteria established in the HHRA will be applied to protect people who consume the fish. The aquatic sediment criteria established in the HHRA ranges from 0.04 mg/kg to 0.30 mg/kg PCB; however, because MDEQ has a detection limit of 0.33 mg/kg for PCBs, the cleanup criteria protective for people consuming fish defaults to 0.33 mg/kg. The sediment cleanup criteria of 0.33 mg/kg PCB is also protective of fish-eating animals. If after applying the inundation period indicator to a wetland area a sediment-to-fish-to-consumer exposure pathway is determined not to present an unacceptable risk to consumers of fish, then a cleanup level that is within the acceptable NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg PCB will be applied to these wetlands to protect terrestrial ecological receptors.

Table 5, below, and the following paragraphs summarize the maximum PCB concentrations detected in the RI; the cleanup criteria applicable to each area; and the media targeted for remediation. Applicable cleanup criteria for OU2 areas are highlighted in gray in Table 5, below.

Table 5 – Maximum PCB Concentrations, Applicable Cleanup Criteria and Media Targeted For Remediation

Operable Unit Areas	Maximum RI PCB Concentration (mg/kg)	Applicable Cleanup Criteria ¹				
		Media Targeted for Remediation	Part 201 Generic Commercial II & Industrial Criteria	Part 201 Residential Land Use Criteria	Terrestrial Criteria (NOAEL/LOAEL) in Ecological Risk Assessment ⁴	Default Sediment Criteria protective of people who eat the fish ⁴
Willow Boulevard Landfill & Willow Drainageway ⁴	Surface ² < 4	Residual	16 mg/kg	4 mg/kg	6.5 mg/kg/8.1 mg/kg	0.33 mg/kg
	Subsurface 160					
	Surface NC ³	Soil	16 mg/kg	4 mg/kg	6.5 mg/kg/8.1 mg/kg	0.33 mg/kg
	Subsurface 30					
A-Site Landfill	Surface < 4	Residual	16 mg/kg	4 mg/kg	6.5 mg/kg/8.1 mg/kg	0.33 mg/kg
	Subsurface 330					
Area South of A-Site Berm ⁴	Surface 14	Soil	16 mg/kg	4 mg/kg	6.5 mg/kg/8.1 mg/kg	0.33 mg/kg
	Subsurface 37					
Former Olmstead Creek ⁴	Surface 7.6	Sediment	16 mg/kg	4 mg/kg	6.5 mg/kg/8.1 mg/kg	0.33 mg/kg
Area East of Davis Creek ⁴	Surface 36	Residual Soil & Sediment	16 mg/kg	4 mg/kg	6.5 mg/kg/8.1 mg/kg	0.33 mg/kg
	Subsurface NC ³					
AMW-3A Area	Surface 5.9	Soil	16 mg/kg	4 mg/kg	6.5 mg/kg/8.1 mg/kg	0.33 mg/kg
	Subsurface 62					

¹ Applicable cleanup criteria shaded in grey.

² PCB concentrations at locations sampled before a temporary sand cover placed on top of the landfill. Pre-RI maximum PCB concentration is 270 mg/kg.

³ Samples were not collected.

⁴ An aquatic sediment cleanup criterion will be applied to wetlands that are inundated for a period of time such that the sediment-to-fish-to-consumer (people and mink) exposure pathway presents an unacceptable risk to consumers of fish. Wetlands that are inundated for a period of time such that the sediment-to-fish-to-consumer exposure pathway does not present an unacceptable risk to consumers of fish, then a cleanup level that is within the NOAEL/LOAEL range of 6.5 mg/kg PCB to 8.1 mg/kg PCB will be applied to these wetlands to protect terrestrial ecological receptors.

Willow Boulevard Landfill

The Willow Boulevard Landfill was not zoned, but its historical use and expected future use is industrial; therefore, PCB concentrations in RI samples were compared to the Part 201 Generic Commercial II/Industrial cleanup criteria of 16 mg/kg, which is protective of human health, and the NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg for the protection of terrestrial receptors.

Based on data collected during the RI, PCB concentrations in surficial residuals do not exceed the Part 201 Generic Commercial II/Industrial cleanup criteria, nor do they exceed the NOAEL/LOAEL range at locations explored. Therefore, based on data collected during the RI, surficial residuals do not pose an unacceptable risk to human health or terrestrial receptors.

However, 2001 photo documentation shows that the geofabric that was placed on top of the Willow Boulevard Landfill during the IRA is torn and that residuals are visibly eroding into the river. Continued erosion of residuals into the Kalamazoo River may pose an unacceptable risk to consumers (people and mink) that are exposed to PCBs through the consumption of fish. In subsurface residuals, the maximum PCB concentration detected is 160 mg/kg. If subsurface residuals were dug up and brought to the surface, then people and terrestrial receptors can be exposed to PCBs in concentrations that would pose an unacceptable risk. Although not a permitted landfill, the State's landfill closure requirements are considered an applicable or relevant and appropriate (ARAR) state requirement. Given these factors, remedial action is warranted at the Willow Boulevard Landfill.

Willow Drainageway

The Willow Drainageway was not zoned, but its historical use and expected future use is industrial. Therefore, PCB concentrations in RI samples were compared to the Part 201 Generic Commercial II/Industrial cleanup criteria of 16 mg/kg, which is protective of human health, and the NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg for the protection of terrestrial receptors. No surface soil or sediment samples were collected during the RI. However, the Drainageway receives surface water runoff from the Willow Boulevard Landfill and surrounding areas; and therefore, it is likely that PCBs may be present in surface soil and/or sediment. A risk to human and ecological receptors may be present if PCB concentrations in surface soil and/or sediment exceed the Part 201 Generic Commercial II/Industrial cleanup criteria or exceed the NOAEL/LOAEL range. The maximum PCB concentration detected in subsurface soil is 30 mg/kg, which exceeds the Part 201 Commercial II/Industrial cleanup criteria of 16 mg/kg PCB and exceeds the NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg. Therefore, if subsurface soil was dug up and brought to the surface, then people and ecological receptors can be exposed to PCBs in concentrations that would pose an unacceptable risk. Given the above factors, remedial action is warranted at the Willow Drainageway.

Additionally, because a portion of the Willow Drainageway is within a wetland, that portion will be further evaluated during the remedial design phase of the remedy as discussed in Section 7.2 of this ROD.

A-Site Landfill

The A-Site Landfill is zoned industrial; therefore, PCB concentrations in RI samples were compared to the Part 201 Generic Commercial II/Industrial cleanup criterion of 16 mg/kg, which is protective of human health, and the NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg for the protection of terrestrial receptors.

Based on data collected during the RI, PCB concentrations in surface soil do not exceed the Part 201 Commercial II/Industrial cleanup criteria and are below the NOAEL/LOAEL range at the locations explored. Therefore, based on data collected during the RI, surficial soils do not pose an unacceptable risk to people or terrestrial receptors. However, 2001 photo documentation shows exposed paper residuals at the surface of the landfill. These areas may pose an unacceptable risk to human and terrestrial receptors if PCB concentrations in the residuals exceed the Part 201 Commercial II/Industrial cleanup criteria or exceed the NOAEL/LOAEL range. In subsurface residuals, the maximum PCB concentration is 330 mg/kg. If subsurface residuals were dug up and brought to the surface, then people and terrestrial receptors can be exposed to PCBs in concentrations that would pose an unacceptable risk. Although not a permitted landfill, the State's landfill closure requirements are considered an ARAR. Given these factors, remedial action is warranted at the A-Site Landfill.

Area South of the A-Site Berm

The Area South of the A-Site Berm is zoned industrial; therefore, PCB concentrations in RI samples were compared to the Part 201 Generic Commercial II/Industrial cleanup criteria of 16 mg/kg, which is protective of human health, and the NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg PCB for the protection of terrestrial ecological receptors. Based on data collected, PCB concentrations in surface soil do not exceed the Part 201 Generic Commercial II/Industrial cleanup criteria but do exceed the NOAEL/LOAEL range. Therefore, surface soils pose a risk to ecological receptors but not to humans. The maximum PCB concentration in subsurface soil is 37 mg/kg, which exceeds the Part 201 Generic Commercial II/Industrial cleanup criteria and exceeds the NOAEL/LOAEL range. If subsurface residuals were dug up and brought to the surface, then people and ecological receptors can be exposed to PCBs in concentrations that would pose an unacceptable risk. Given the above, remedial action is warranted at the Area South of the A-Site Berm.

Additionally, because the Area South of the A-Site Berm is within a wetland, this area will be further evaluated during the remedial design phase of the remedy as discussed in Section 7.2 of this ROD.

Davis Creek

Davis Creek is a water body and therefore, is not zoned for land use. PCB concentrations detected in sediment do not exceed any applicable cleanup criteria including the default sediment criteria of 0.33 mg/kg for the protection of people who eat the fish. Therefore, no remedial action is warranted at Davis Creek.

Former Olmstead Creek

The former Olmstead Creek area is zoned industrial; therefore, PCB concentrations in RI sediment samples were compared to Part 201 Commercial II/Industrial cleanup criteria of 16 mg/kg, which is protective of human health, and the NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg PCB for the protection of terrestrial ecological receptors.

PCB concentrations in RI sediment samples do not exceed the Part 201 Generic Commercial II/Industrial cleanup criteria and PCB concentrations are within the NOAEL/LOAEL range. However, because the former Olmstead Creek is within a wetland, the creek will be further evaluated during the remedial design phase of the remedy as discussed in Section 7.2 of this ROD.

Area East of Davis Creek

The Area East of Davis Creek is zoned industrial; therefore, PCB concentrations in RI residuals were compared to Part 201 Commercial II/Industrial cleanup criteria of 16 mg/kg, which is protective of human health, and the NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg PCB for the protection of terrestrial ecological receptors. The maximum PCB concentration in surficial residual exceeds the Part 201 Commercial II/Industrial cleanup criteria and the NOAEL/LOAEL range. Therefore, surficial residuals pose a risk to human and ecological receptors. Given the above, remedial action is warranted at the Area East of Davis Creek.

Additionally, because the Area East of Davis Creek is within a wetland, this area will be further evaluated during the remedial design phase of the remedy as discussed in Section 7.2 of this ROD.

AMW-3A Area

The AMW-3A Area is zoned residential; therefore, PCB concentrations in RI soil samples were compared to Part 201 Residential cleanup criteria of 4 mg/kg and the NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg for the protection of ecological receptors. Maximum PCB concentrations in surface soil exceed the Part 201 Generic Residential cleanup criteria but do not exceed the NOAEL/LOAEL range. Therefore, surface soils pose an unacceptable risk to humans but not to ecological receptors. The maximum PCB concentration in subsurface soil exceeds the Part 201 Generic Residential cleanup criteria and the NOAEL/LOAEL range. If subsurface residuals were dug up and brought to the surface, then people and ecological receptors can be exposed to PCBs in concentrations that would pose an unacceptable risk. Given the above, remedial action is warranted at the AMW-3A area.

Residential Areas

The only residential areas adjacent to OU2 are located to the south of the landfills. Residential - zoned areas were compared to the Part 201 Residential cleanup criteria of 4 mg/kg and the NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg for the protection of ecological receptors. At locations where samples were taken, soils at residential properties south of the Willow Boulevard and A-Site Landfills do not exceed the Part 201 Residential cleanup criteria or the

NOAEL/LOAEL range; therefore, soils do not pose a risk to people or ecological receptors. Given the above, no remedial action is warranted at the residential areas south of OU2.

7.3 Basis for Action

A response action at OU2 is warranted because PCB concentrations in surficial residuals, soil, and sediment at OU2 exceed the Part 201 Commercial II/Industrial and Residential cleanup criteria and/or the NOAEL/LOAEL range established in the BERA for the protection of ecological receptors and because the landfills will be left in place in perpetuity. Additionally a response action at OU2 may be warranted because of the potential migration of PCBs from the landfills and adjacent areas (via erosion or surface water runoff) into the Kalamazoo River and because of PCB concentrations in sediment located in OU2 wetland areas that may present an unacceptable risk to consumers of the fish. Due to the above considerations, the response action selected in this Record of Decision is necessary to protect the public health or welfare or the environment from the actual or threatened releases of hazardous substances into the environment.

8.0 Remedial Action Objectives and ARARs

8.1 Remedial Action Objectives (RAOs)

The Remedial Action Objectives for OU2 are to: 1) eliminate exposure to PCB-contaminated material exceeding applicable land-use and/or risk based cleanup criteria; 2) prevent PCB migration, via erosion or surface water runoff, into the Kalamazoo River; and 3) mitigate, to the extent practicable, adverse effects to the environment due to implementation of a remedial action.

8.2 Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA requires that Superfund remedial actions at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as ARARs, unless such ARARs are waived under CERCLA Section 121(d)(4). Applicable requirements are those cleanup standards and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a Superfund site. Relevant and appropriate requirements are those cleanup standards and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not applicable, address problems or situations sufficiently similar to those encountered at the Superfund site that their use is well suited to the particular site.

In addition to ARARs, guidance materials that have not been promulgated or regulatory standards that are not applicable or relevant and appropriate may be considered (including local/county requirements); these are referred to as items “to be considered” (TBC). While TBCs may be considered along with ARARs, they do not have the status of ARARs. A complete list of ARARs and TBCs identified for OU2 are presented in Section 13.2 of this ROD.

9.0 Description of Alternatives

Following development of RAOs, a number of technology types and process options⁵ for addressing PCB-contaminated material at OU2 were identified and screened in the FFS. Based upon the screening of technologies, MDEQ evaluated and assembled a range of alternatives. Four remedial alternatives (Alternative 1, Alternative 2 with bank stabilization options 2A, 2B, or 2C, Alternative 3, and Alternative 4) were evaluated in the FFS and are identified below.

Alternative 1: No Action

Alternative 2: Consolidation and Containment of Select Materials⁶

Sub-alternative 2A: Consolidation and Containment of Select Materials, Install New Sheet Piling at Willow Boulevard Landfill, and Retain Existing Sheet Piling at A-Site Landfill

Sub-alternative 2B: Consolidation and Containment of Select Materials, Remove Existing Sheet Piling at A-Site Landfill, and Re-Grade/Stabilize Banks with a Setback at Willow Boulevard and A-Site Landfills

Sub-alternative 2C: Consolidation and Containment of Select Materials, Re-Grade/Stabilize Banks using Ecologically Friendly Materials with a Setback at Willow Boulevard Landfill, and Retain Existing Sheet Piling at A-Site Landfill

Alternative 3: Removal of all OU2 Residual/Material and Off-Site Disposal

Alternative 4: Removal of the Willow Boulevard Landfill Residuals and Consolidation at the A-Site Landfill

⁵ An example of a technology type is “soil removal,” and an example process option within that technology type is “mechanical excavation.” Selection of a particular process option as representative was done to streamline the development of potential remedial alternatives.

⁶ “Select materials” refers to PCB-contaminated residual, soil, and/or sediment at the Willow Drainageway Area, the Area South of the A-Site Berm (including the Former Olmstead Creek), the Area East of Davis Creek, and the area near monitoring well AMW-3A.

9.1 Description of Alternatives/Remedy Components

9.1.1 Alternative 1 - No Action

Description of Alternative

The no-action alternative is required under the NCP and serves as a baseline against which the other potential remedial alternatives can be compared. This alternative would result in increased potential for PCBs to migrate to the Kalamazoo River over time since no action and no maintenance of the existing fence, would increase the chance of exposing trespassers and anglers to PCB-containing residuals.

Cost

No costs are associated with this alternative.

9.1.2 Alternative 2 – Consolidation and Containment of Select Materials

Description of Alternative

Alternative 2 is not a stand-alone remedy, as it would be paired with one of the bank stabilization options described under Sub-alternatives 2A, 2B, or 2C. Under Alternative 2, approximately 13,800 cyd³ of PCB-contaminated residual, soil, and/or sediment would be excavated from the Willow Drainageway, the Area South of the A-Site Berm (including Former Olmstead Creek), the Area East of Davis Creek, and the area near monitoring well AMW-3A, and consolidated with existing residuals at the A-Site Landfill. Post-removal confirmatory sampling and analysis would be performed at the excavation areas. Excavated areas would be mitigated by backfilling with clean sand to prevent ponding and revegetated to prevent erosion. Areas identified as wetlands would be backfilled to grade or restored in accordance with an approved wetland restoration plan. After all waste is placed into the A-Site Landfill, both the Willow Boulevard and A-Site Landfills will be capped with a cover system that is compliant with Part 115, Solid Waste Management, of the NREPA. Erosion control measures, such as riprap, would be placed on the sides of the landfill to protect the cap and contents of the landfill from a 100-year flood. The isolation of PCB-containing residuals would reduce the potential for human and ecological exposure and erosion control measures would reduce the migration of contaminated materials into the Kalamazoo River and adjacent areas. Long-term maintenance of the cap and institutional controls (perimeter fence with posted warning signs and deed restrictions) would be implemented. Groundwater monitoring will also be conducted and results evaluated. If contaminants are present in groundwater at concentrations that present a risk to public health or wildlife, then a groundwater cleanup remedy may be required, but that remedy will be done under a separate U.S. EPA action.

Cost

Alternative 2 costs are associated with the following construction activities: mobilization/demobilization, work area isolation, site preparation, consolidation of select residuals/soils/sediments, sediment stockpile/stabilization (if necessary), water treatment, bank/dike consolidation and stabilization, erosion control, cap with a flexible membrane liner

(FML), vegetative cover, and health and safety. Costs for Alternative 2 with bank stabilization options 2A, 2B, and 2C are presented below.

9.1.3 Sub-alternative 2A - Consolidation and Containment of Select Materials, Install New Sheet Piling at Willow Boulevard Landfill, and Retain Existing Sheet Piling at the A-Site Landfill

Description of Alternative

This option includes all components of Alternative 2 and includes the installation of new sheet piling along the perimeter of the Willow Boulevard Landfill adjacent of the Kalamazoo River. Sheet piling, as an erosion control measure, would reduce the migration of contaminated materials into the Kalamazoo River. Under this option, 1,800 feet of sheet pile will be installed and extended at least 2 feet above the 100 year flood elevation to prevent PCB migration (via erosion or surface water runoff) from the landfill into the Kalamazoo River, the Former Olmstead Creek, and Davis Creek.

Cost

The estimated capital cost is approximately \$8.26 million, while the operation and maintenance (O&M) cost is approximately \$399,000 per year, including costs associated with long-term groundwater monitoring, for a total O&M cost of approximately \$4.95 million (30-year present worth analysis based on a 7% discount rate). The total project present worth cost for Sub-alternative 2A is approximately \$13.3 million.

9.1.4 Sub-alternative 2B - Consolidation and Containment of Select Materials, Remove Existing Sheet Piling at A-Site Landfill, and Re-Grade/Stabilize Banks with a Setback at Willow Boulevard and A-Site Landfills

Description of Alternative

This option includes all components of Alternative 2 and requires the existing sheet piling at the A-Site Landfill be removed or cut off below the waterline. The banks of the Willow Boulevard and A-Site Landfills would be pulled back to create a setback or protective buffer along the Kalamazoo River. The new banks of the landfill will be protected against erosion by using low-profile techniques including, but not limited to, articulated concrete, geoweb materials, or revetment blankets. As described under Alternative 2, the isolation of PCB-containing residuals would reduce the potential for human exposure and migration of contaminated materials into the Kalamazoo River. The setback and erosion control measures would allow new berms to be built and reduce habitat degradation posed by sheet pile by providing a buffer zone, while offering protection from flooding.

Costs

For purposes of cost analysis, a 50-foot setback distance from the river's edge was assumed. The actual setback distance would be determined during remedial design. Given the assumption of 50-foot setback, the estimated capital cost is approximately \$7.71 million, while the O&M cost is approximately \$399,000 per year, including costs associated with long-term groundwater

monitoring, for a total O&M cost of approximately \$4.95 million (30-year present worth analysis based on a 7% discount rate). The total project present worth cost for Sub-alternative 2B is approximately \$12.7 million.

9.1.5 Sub-alternative 2C -Containment of Select Materials, Re-Grade/Stabilize Banks using Ecologically Friendly Materials with a Setback at Willow Boulevard Landfill, and Retain Existing Sheet Piling at A-Site Landfill

Description of Alternative

This option includes all components of Alternative 2 but establishes a setback along the Kalamazoo River only at the Willow Boulevard Landfill; the sheet pile at the A-Site Landfill would remain in place. Upon re-grading and capping, the banks would be reinforced using permanent but ecologically friendly means of bank stabilization also commonly referred to as “soft engineering.” Soft engineering techniques may include, but are not limited to shallow bank slopes, planting of live vegetation, log revetments, etc. As in Alternative 2, the isolation of PCB-containing residuals would reduce the potential for human exposures and reduce the potential migration of contaminated materials into the Kalamazoo River. This option attempts to integrate the A-Site Landfill’s existing sheet piling with ecologically friendly erosion control measures at the Willow Boulevard Landfill reducing the impact (and habitat loss) of bank stabilization while controlling costs. This alternative also attempts to be responsive to the community’s desire to reduce the landfill footprint and have a component of the remedy address aesthetics and habitat issues.

Costs

The actual setback distance would be established during remedial design. For purposes of cost analysis, a 50-foot setback distance from the river’s edge was assumed. Given this assumption, the estimated capital cost is approximately \$6.57 million, while the O&M cost is approximately \$399,000 per year, including costs associated with long-term groundwater monitoring, for a total O&M cost of approximately \$4.95 million (30-year present worth analysis based on a 7% discount rate). The total project present worth cost for Sub-alternative 2C is approximately \$11.5 million.

9.1.6 Alternative 3 - Removal and Off-Site Disposal

Description of Alternative

Alternative 3 would involve the removal of all PCB-containing residuals (approximately 634,200 cyd³) from OU2 and adjacent areas and disposal in an off-site landfill permitted to receive TSCA material. This would be accomplished through the excavation, dewatering, and off-site disposal of residuals from the Willow Boulevard Landfill, the A-Site Landfill, and adjacent areas. Excavated residuals from these sites would be transported to and disposed of in an off-site landfill, thereby reducing or eliminating the need for on-site long-term monitoring or management. In the Area East of Davis Creek and the AMW-3A area, the extent of PCB contamination would be better defined. Adjacent residential properties (i.e., lots 38, 40, 41, 42, and 43) would be assessed to ensure excavation at OU2 does not reduce drainage capacity or

increase the likelihood of flooding; backfilling and re-vegetation may be necessary. Following the removal and disposal of residuals, these areas would be backfilled with clean material, graded, and restored to match the surrounding area.

Costs

Costs for this alternative are associated with construction activities including mobilization/demobilization, work area preparation, excavating residuals, stockpiling/stabilizing residuals, dewatering residuals, water treatment, transport and disposal of materials, site restoration, and health and safety. No O&M costs are associated with this alternative since all wastes would be disposed of off-site. The estimated capital cost associated with Alternative 3 is approximately \$46.1 million. Transportation and disposal of excavated residuals account for approximately 42 percent of the total capital cost. Costs for this alternative could be higher if portions of the waste in OU2 are determined to be characteristically hazardous waste under RCRA.

9.1.7 Alternative 4 - Removal of the Willow Boulevard Landfill Residuals and Consolidation at the A-Site Landfill

Description of Alternative

Alternative 4 would involve the removal of PCB-containing residuals (approximately 158,800 cyd³) from the Willow Boulevard Landfill (including the Willow Drainageway, the Area South of the A-Site Berm, and the Area East of Davis Creek). This would be accomplished through the excavation, dewatering, and on-site consolidation of residuals into the A-Site Landfill. The A-Site Landfill would be capped using a cover system (including a FML, as proposed by the PRP). The removal and isolation of PCB-containing residuals would eliminate the potential for human exposure, while erosion control measures would prevent the migration of contaminated residuals into the Kalamazoo River. In the Area East of Davis Creek and the AMW-3A area, the extent of soils containing PCBs exceeding appropriate cleanup criteria would be defined and addressed. Adjacent residential properties (i.e., lots 38, 40, 41, 42, and 43) would be assessed to ensure excavation at OU2 does not reduce drainage capacity or increase the likelihood of flooding; backfilling and re-vegetation may be necessary. Following the removal and disposal of residuals, these areas would be backfilled with clean material, graded, and restored to match the surrounding area. Long-term maintenance of the cover and institutional controls (perimeter fence with posted warning signs and deed restrictions) would be implemented. Groundwater monitoring will also be conducted consistent with the approach approved at the King Highway Landfill Operable Unit.

Costs

Costs for this alternative are associated with construction activities, including mobilization/demobilization, work area preparation, excavating and dewatering residuals, stockpiling/stabilizing residuals, water treatment, transport, and consolidation of materials, capping the A-Site, installing vegetative cover, and site restoration. The estimated capital cost associated with Alternative 4 is approximately \$12.86 million. The annual estimated O&M cost is approximately \$236,000 per year, including costs associated with long-term groundwater monitoring, for a total O&M cost of approximately \$2.93 million (30-year present worth analysis).

based on a 7% discount rate). The total project present worth cost for Alternative 4 is approximately \$15.8 million.

9.2 Common Elements and Distinguishing Features of Each Alternative

9.2.1 Common Elements

All alternatives, except Alternative 1, actively remediate OU2; however, some alternatives remediate to a greater degree than others do. Alternative 3 provides the highest degree of remediation since all PCB-contaminated materials at OU2 would be removed and disposed of off-site. Alternative 4 provides a high degree of remediation, but to a lesser extent than Alternative 3. Alternative 4 would result in a smaller landfill “footprint” by removing all residuals from the Willow Boulevard Landfill, and consolidating and containing those residuals at the A-Site Landfill. Alternative 1, Alternative 2 (with options 2A, 2B, and 2C) and Alternative 4 would require long-term monitoring of OU2, including groundwater monitoring and institutional controls since PCB-contaminated residuals would remain onsite. Only Alternative 3 may not require long-term monitoring since all PCB-contaminated residuals would be removed and disposed of at an off-site landfill.

9.2.2 Distinguishing Features

No active remediation would occur under Alternative 1. No sheet pile would exist at OU2 under Sub-alternative 2B and Alternative 3 because the existing sheet pile would be removed from the A-Site Landfill. Sheet pile would be present only at one landfill under Alternative 1 and Sub-alternative 2C, and at both landfills under Sub-alternative 2A. Long-term monitoring of OU2 may not be needed under Alternative 3 since both landfills would be removed and contaminated material disposed of off-site.

10.0 Summary of Comparative Analysis of Alternatives

This section of the ROD compares the alternatives against the nine criteria, noting how each compares to the other alternatives. A detailed evaluation of the original six alternatives can be found in the FFS. When selecting a remedy for a site, U.S. EPA considers the factors set forth in Section 121 of CERCLA by conducting a detailed analysis of the remedial alternatives in accordance with the NCP. Guidance documents have been developed to provide assistance for selecting a remedy, such as U.S. EPA’s *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (OSWER Directive 9355.3-01) and U.S. EPA’s *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (OSWER 9200.1-23.P). The detailed analysis consists of an assessment of the individual alternatives against each of the nine evaluation criteria (two threshold, five primary balancing, and two modifying criteria) and a comparative analysis focusing upon the relative performance of each alternative against those criteria. The nine evaluation criteria are described below.

Threshold Criteria

1. **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed by the site are eliminated, reduced, or controlled through treatment, engineering, or institutional controls. The selected remedy must meet this criterion.
2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether a remedy will meet the applicable or relevant and appropriate requirements. The selected remedy must meet this criterion or a waiver of the ARAR must be obtained.

Primary Balancing Criteria

3. **Long-Term Effectiveness and Permanence** refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met.
4. **Reduction of Toxicity, Mobility, or Volume Through Treatment** addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as their principal element. This preference is satisfied when treatment is used to reduce the principal threats at the site through destruction of toxic contaminants, reduction of the total mass of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.
5. **Short-Term Effectiveness** addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction of the remedy until cleanup levels are achieved. This criterion also considers the effectiveness of mitigative measures and time until protection is achieved through attainment of the RAOs.
6. **Implementability** addresses the technical and administrative feasibility of a remedy from design through construction, including the availability of services and materials needed to implement a particular option and coordination with other governmental entities.
7. **Cost** includes estimated capital costs, annual operation and maintenance costs (assuming a 30-year time period), and net present value of capital and operation and maintenance costs, including long-term monitoring.

Modifying Criteria

8. **State Agency Acceptance** considers whether the State support agency concurs with the selected remedy for the site.

9. **Community Acceptance** addresses the public's general response to the remedial alternatives and the preferred alternative presented in the Proposed Plan. The ROD includes a responsiveness summary that summarizes the public comments and U.S. EPA's response to those comments. The responsiveness summary is included under Part III of this ROD.

The full text of the detailed analysis of the six remedial alternatives against the nine evaluation criteria (including both the individual analysis and the comparative analysis) is contained in the November 2004 *Focused Feasibility Study Report* which is included in the Administrative Record for OU2. This section of the ROD summarizes the highlights of the comparative analysis.

10.1 Overall Protection of Human Health and the Environment

Sub-alternatives 2A, 2B, 2C and Alternatives 3 and 4 include measures that actively address PCB-contaminated material within the landfills and adjacent areas. Alternative 3 affords the highest degree of overall protection of human health and the environment since its implementation would result in the excavation and off-site disposal of all PCB-containing materials at OU2, thereby eliminating risks to the public and ecological receptors. Alternative 4 affords a high degree of overall protection but to a lesser extent than Alternative 3. Under Alternative 4, risk to human health and the environment would be reduced since all PCB-containing materials (above and below the water table) within the Willow Boulevard Landfill and at adjacent areas, would be excavated and contained under an engineered cap at the A-Site Landfill. Overall protection can also be achieved by isolating PCB-contaminated materials onsite under an engineered cap (Sub-alternatives 2A, 2B, 2C, and Alternative 4) and implementing bank stabilization, erosion control measures, institutional controls, and long-term maintenance. These components would eliminate the potential for direct contact with residuals and reduce PCB transport into the Kalamazoo River. No active remediation measures would be taken under Alternative 1; and therefore, it would not be protective of public health and the environment.

10.2 Compliance with ARARs

Section 121(d) of CERCLA requires that Superfund remedial actions meet ARARs. A brief discussion of the primary ARARs is provided below. In addition to ARARs, non-enforceable guidelines, criteria, and standards may be useful in evaluating remedial alternatives. As described previously in Section 8.2 of this ROD, these guidelines, criteria and standards are known as TBCs.

ARARs for the selected remedy include the following:

- Surface water quality standards contained in Part 31, Water Resources Protection, of the NREPA;

- Rules established pursuant to Part 31, Water Resources Protection, of the NREPA regarding permit requirements;
- Site-specific pollutant limitations and performance standards which are designed to protect surface water quality contained in the Federal Clean Water Act (CWA);
- Regulations prohibiting unauthorized obstruction or alteration of any navigable water in the United States (dredging, fill, cofferdams, piers, etc.) contained in the Federal River and Harbor Act;
- Regulations regarding the dredging or filling of lakes or stream bottoms contained in Part 301, Inland Lakes and Streams, of the NREPA;
- Rules prescribing soil erosion and sedimentation control plans, procedures, and measures contained in Part 91, Soil Erosion and Sedimentation Control, of the NREPA;
- Rules prohibiting the emissions of air contaminants in quantities which cause injurious effects to human health, animal life, plant life of significant economic value, and/or property contained in Part 55, Air Pollution Control, of the NREPA;
- National ambient air quality standards contained in the Federal Clean Air Act;
- Statutory provisions and rules specifying environmental response, risk assessment, RA, and site cleanup criteria pursuant to Part 201, Environmental Remediation, of the NREPA;
- Certain regulations regarding the construction, operation, and closure of sanitary landfills, solid waste transfer facilities, and solid waste processing plants pursuant to Part 115, Solid Waste Management, of the NREPA;
- Effluent standards for toxic compounds including PCBs contained in the Federal WPCA Toxic Pollutant Effluent Standards;
- Regulations regarding activities in wetlands found in Part 303, Wetland Protection, of the NREPA; and
- Federal regulations under the Toxic Substances and Control Act (TSCA) regarding the risk-based disposal of PCB remediation waste, 40 C.F.R. § 761.61(c).

All alternatives would comply with all ARARs with the exception of Alternative 1. Alternative 1 would not be compliant with Part 201, which establishes the cleanup criteria to be used while remediating a site. Alternative 1 would also not comply with the TSCA ARAR, as an unreasonable risk of injury to human health and the environment would exist.

10.3 Long-Term Effectiveness and Permanence

A primary measure of long-term effectiveness of an alternative is the magnitude of residual risk to human health and the environment after remediation. Alternative 1 would not be an effective or permanent alternative, because it does not reduce risk. With proper and effective operation and maintenance, Sub-alternatives 2A, 2B, 2C and Alternatives 3 and 4 would provide long-term effectiveness by isolating or removing PCB-contaminated material from OU2. Alternative 3 has the highest degree of long-term effectiveness and permanence because all PCB-containing materials would be excavated and disposed of at an off-site permitted landfill. Sub-alternatives 2A, 2B, 2C and Alternative 4 (consolidation and containment) also have a high degree of effectiveness, but must rely on long-term maintenance to prevent barrier deterioration and ensure that potential exposure pathways are controlled. The magnitude of residual risk and exposure to human health and the environment is directly related to the adequacy and reliability of the cover system, long-term groundwater monitoring, and institutional controls.

10.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

None of the five alternatives includes any active treatment of contaminated materials; therefore, there would be no reduction in toxicity, mobility, or volume through treatment. However, four of the alternatives result in varying degrees of reductions to mobility and/or volume.

Alternative 1 would achieve no reduction in mobility of contaminated residuals along the riverbank or floodplain, no reduction in toxicity, and no reduction in volume. Sub-alternatives 2A, 2B, and 2C would reduce mobility by isolating residuals in place through consolidation of residuals/soil/sediment and placement of a cap (with a FML), but there would be no net reduction of volume at OU2. Sub-alternatives 2A, 2B, and 2C do not eliminate the potential for mobilization of contaminants to the groundwater and surface water interface (GSI), as saturated residuals below the water table would remain at the Willow Boulevard Landfill. Long-term groundwater monitoring would verify whether PCBs are mobilizing to groundwater so that an appropriate action could be taken.

Alternative 3 would reduce the potential mobility of contaminated materials through the removal and containment at a permitted off-site landfill. Alternative 3 would also reduce the volume of PCB-contaminated material at OU2 through excavation and off-site disposal of materials, but this volume would just be moved from one place to another. Alternative 4 provides no net reduction in volume since the PCB-contaminated material from the Willow Boulevard Landfill and adjacent areas would be consolidated into the A-Site Landfill. Alternative 4 would reduce mobilization of contaminants through isolation and containment under a landfill cap.

10.5 Short-Term Effectiveness

There are no short-term effectiveness concerns associated with Alternative 1 because no active remedial measures would be implemented. Sub-alternatives 2B and 2C have short-term impacts

associated with them because they both require excavating and moving residuals. Although controls and monitoring reduce the potential for short-term impacts, risks associated with PCB exposure by workers and possibly the community (via dust borne releases) would increase proportionally with increased handling of materials. Because Alternative 3 involves removal and transport of a large amount of material, it poses an incremental increase in short-term exposure risk and a possible further reduction in short-term effectiveness. Alternative 4 also involves similar short-term effectiveness concerns, but it does not involve as much excavation, materials handling, or transportation as Alternative 3. These factors make Alternative 3 the least effective alternative in the short-term. Sub-alternative 2C has a moderate amount of short-term impacts associated with it but less than Sub-alternative 2B, which requires more excavation and handling of materials. Sub-alternative 2A has the least amount of short-term impacts since it involves the least amount of materials handling.

10.6 Implementability

Alternative 1 cannot be evaluated by this criterion because no active remedial measures would be implemented. Sub-alternatives 2A, 2B, 2C and Alternatives 3 and 4 include remedial measures that include proven technologies and that are considered to be technically feasible. Services and materials necessary to implement these alternatives are readily available through local vendors.

Alternative 3 would require a substantial amount of equipment. The engineering, design, and administrative requirements increase with the complexity of the alternative in the following order: Sub-alternative 2A (no excavation), Sub-alternative 2C (limited excavation), Sub-alternative 2B (significant excavation), Alternative 4 (extensive excavation), and Alternative 3 (complete excavation). The degree of difficulty in implementing these alternatives increase with the amount and type of material that would be excavated and the distance it would take to travel to the selected disposal facility. Excavating residuals below the groundwater table may present a high degree of technical difficulty. Due to the magnitude of work required for Alternatives 3 and 4, Sub-alternative 2A would be considered the most implementable, then Sub-alternative 2C, followed by Sub-alternative 2B.

10.7 Cost

Cost includes estimated capital costs and annual operation and maintenance costs (assuming a 30-year time period and a 7% discount rate). Present worth cost represents the total cost of an alternative over time in terms of today's dollar value. In accordance with U.S. EPA guidance, cost estimates are expected to be accurate within a range of +50 to -30 percent. Detailed cost estimates for the four remedial alternatives are presented in the November 2004 *Focused Feasibility Study Report* and in Attachment 1 to this ROD. The estimated present worth cost to implement the six potential remedial alternatives at OU2 are as follows:

- Alternative 1: \$0
- Sub-alternative 2A: \$13.3 million
- Sub-alternative 2B: \$12.7 million

- Sub-alternative 2C: \$11.5 million
- Alternative 3: \$46.1 million
- Alternative 4: \$15.8 million

10.8 State Agency Acceptance

The MDEQ authored the RI/FFS, which included an evaluation and analysis of potential remedial alternatives against the nine evaluation criteria under the NCP. As the support agency, U.S. EPA reviewed and provided comments to the MDEQ on the RI/FFS. After MDEQ finalized the RI/FFS Report, the U.S. EPA then became the lead-enforcement agency responsible for identifying a preferred remedial alternative in the Proposed Plan and for documenting the selected remedial alternative in the ROD.

The State concurs with the selection of Sub-alternative 2C for OU2, but it also supports an enhanced remedy that would incorporate the Kalamazoo River Trustee Councils' restoration goals for OU2. The State's concurrence letter and the Kalamazoo River Trustee Councils' restoration goals, as described in its August 19, 2005 letter, are included in the Administrative Record for OU2.

10.9 Community Acceptance

During the public comment period, a majority of the local community supported Sub-alternative 2C but also supported Alternatives 3 and 4. Some citizens suggested that Alternative 4 should be combined with components of Sub-alternatives 2B and 2C as being the most acceptable and aesthetically pleasing to the local community. The community does not consider Alternative 1 as desirable because no action would be taken and PCB-contaminated materials would remain permanently at OU2. Sub-alternative 2A is also not desirable to the community because citizens strongly object to the use of more sheet pile along the Kalamazoo River. A summary of all public comments can be found in the Responsiveness Summary in Part III to this ROD.

11.0 Principal Threat Wastes

The NCP establishes an expectation that U.S. EPA will use treatment to address principal threat wastes wherever practicable. Principal threat wastes are source materials that are considered highly toxic or highly mobile, that cannot be reliably contained, or present a significant risk to human health or the environment. Low level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of release. They include source materials that exhibit, among other things, low mobility in the environment.

There are no principal threat wastes at OU2. PCB-contaminated material within the landfills and adjacent areas are not highly mobile since the PCBs readily bind to clay materials used in the processed paper, are of low solubility, and have a low permeability (8×10^{-7} cm/sec), which is equivalent to a flexible membrane liner used at regulated landfills. Additionally, the NCP establishes an expectation that U.S. EPA will use engineering controls, such as containment, for

wastes that pose a relatively low long-term threat. Residuals at OU2 can be reliably contained under a landfill cap, and long-term O&M can be performed to ensure the reliability of the cap, thereby further reducing the potential for mobility of PCB-contaminated material into the environment.

12.0 Selected Remedy

Alternative 2, with stabilization option 2C (Sub-alternative 2C) is the selected remedy for OU2. This alternative consists of consolidation and containment of PCB-contaminated materials, creating a setback (or buffer zone) from the Kalamazoo River at the Willow Boulevard Landfill portion of OU2, and re-grading and stabilizing the riverbanks using ecologically friendly materials at the Willow Boulevard Landfill to improve habitat quality. Sub-alternative 2C also allows the existing sheet pile wall at the A-Site Landfill portion of OU2 to remain in place. Adverse effects of the remedial action will be mitigated by backfilling excavation areas to grade with clean soil and establishing a vegetative cover over the area. All identified wetland areas where remediation occurs will be restored back to a wetland area after remediation. Additionally, long-term maintenance, institutional controls to restrict public access, and groundwater monitoring will be implemented. The remedial action will reduce or eliminate the risk to human health and ecological receptors by preventing exposure to PCB-contaminated materials, and will reduce potential PCB migration (via erosion or surface water runoff) into the Kalamazoo River and adjacent areas. Sub-alternative 2C meets the threshold criteria, protection of human health and the environment, and compliance with ARARs. Sub-alternative 2C also provides the best balance among the balancing criteria, and a majority of the local community accepts the selected remedy, as expressed in the written comments received on the Proposed Plan.

12.1 Summary of the Rationale for the Selected Remedy

The main factors influencing U.S. EPA in its selection of Sub-alternative 2C include:

- 1) The risk to human health and ecological receptors will be reduced or eliminated by preventing exposure (through excavation, consolidation, and containment) via direct contact with PCB-contaminated materials and further erosion of PCB contaminated material into the Kalamazoo River and adjacent areas;
- 2) Implementation of institutional controls will prevent future exposure to PCB-contaminated material by restricting public access to OU2;
- 3) Long-term maintenance and groundwater monitoring will assess the integrity and effectiveness of the overall remedy;
- 4) Sub-alternative 2C is as equally protective of human health and as compliant with ARARs as remedial Alternatives 3 and 4, but it costs significantly less than those Alternatives. Additionally, while Sub-alternative 2B costs only 10% more than Sub-

Alternative 2C, it does not consider the community's objection to the addition of more sheet pile along the Kalamazoo River; and

- 5) Sub-alternative 2C could be enhanced to include either the complete removal and off-site disposal of PCB-contaminated material (Alternative 3), or partial removal and onsite consolidation (Alternative 4) as part of a compensatory action under a Natural Resource Damage Claim by the Trustee Council.

12.2 Description of the Selected Remedy

The remedial action for OU2 addresses papermaking residual, soil, and sediment contaminated with PCBs. As directed by the selected remedy, PCB-contaminated material will be excavated from adjacent areas and consolidated with existing residuals at the A-Site Landfill. At the Willow Boulevard Landfill, a setback will be created and a new ecologically friendly dike installed to improve habitat along the river. The setback distance was assumed to be 50 feet, but the actual distance will be determined during the design phase of the remedy. The setback and dike will physically separate the Willow Boulevard Landfill from the Kalamazoo River and prevent the transport of PCBs into the Kalamazoo River. In places where no adequate dike exists, an earthen berm will be constructed along the perimeter of the Willow Boulevard Landfill to provide a separation between the landfill and adjacent residences.

At the A-Site Landfill, the existing sheet pile that separates the landfill from the river will remain in place. In places where sheet pile has not been installed, bank stabilization will include limited excavation and re-grading of dike soils to achieve a stable slope and placing a zone of rip-rap at the toe of the dike to prevent erosion. A cap will be constructed and installed over both the Willow Boulevard and the A-Site Landfills. The cap will physically isolate and contain residuals in place, thereby removing the risk to human health and ecological receptors by preventing exposure to PCB-contaminated materials. The cover will minimize infiltration of rainwater through the landfills and prevent erosion and migration of PCBs from the landfills into the Kalamazoo River.

Institutional controls (fence with posted warning signs and deed restrictions) will prevent public access to the property and prevent the public's exposure to contaminated materials. Long-term maintenance of the components of the remedy is also required. If contaminants are present in groundwater at concentrations that present a risk to public health or ecological receptors, then a groundwater cleanup remedy may be required, but that remedy will be done under a separate U.S. EPA action. The specific details on how the remedy (access roads, haul road, staging areas, grubbing and clearing, etc.) will be implemented will be developed during the design phase of the remedy and approved by U.S. EPA.

Following completion of excavation activities, areas affected by construction activities will be mitigated by backfilling excavation areas to grade with clean soil and restored by establishing a vegetative cover. The Area East of Davis Creek would also be restored back to a wetland area.

The restoration approach for areas outside the landfill boundary and for the Area East of Davis Creek, which is a State regulated wetland, will be different from the restoration approach of the landfills. The specific restoration approach for each area of OU2 will be determined during the design phase. Periodic monitoring and necessary maintenance of the restored areas also will be conducted to assess the effectiveness of the stabilization and re-vegetation measures.

During implementation of the remedy, appropriate engineering controls (such as dust control, soil erosion control, and sedimentation control measures) will be conducted, as determined during the design phase, to mitigate short-term effects during the cleanup. Environmental monitoring (such as air monitoring and surface water monitoring) also will be conducted, as determined during the design phase, to evaluate short-term impacts from the construction activities and respond to them as needed. Georgia-Pacific will be responsible for the implementation, maintenance, and monitoring of all aspects of the selected remedy including but not limited to, implementing institutional controls.

12.3 Summary of the Estimated Remedy Costs and Time Required for Implementation

Assuming a 50-foot setback distance, the estimated capital cost for the selected remedy is \$6.57 million, while the O&M cost is approximately \$399,000 per year, including costs associated with long-term groundwater monitoring, for a total O&M cost of approximately \$4.95 million (based on a 30-year present worth analysis). The total project present worth cost is \$11.5 million. Construction activities are expected to take two years to complete. A detailed cost estimate for the selected remedy can be found in Attachment 2 to this ROD.

12.4 Expected Outcomes of the Selected Remedy

The selected remedy is expected to meet the RAOs for OU2 by eliminating exposure to PCB-contaminated material exceeding Part 201 Commercial II/Industrial (16 mg/kg) and Residential (4 mg/kg) cleanup criteria, for the protection of human health, and/or the NOAEL/LOAEL range (6.5 mg/kg to 8.1 mg/kg) established in the BERA, for the protection of ecological receptors. The selected remedy is also expected to meet the RAOs for OU2 by eliminating the potential migration of PCBs from the landfills and adjacent areas (via erosion or surface water runoff) into the Kalamazoo River. It will additionally meet the RAOs by eliminating exposure to PCB-contaminated sediments located in OU2 wetland areas that may present an unacceptable risk to consumers of the fish. These cleanup standards are protective of human health and ecological receptors. At the completion of the remedial action, OU2 will not be available for unlimited use and unrestricted exposure.

13.0 Statutory Determinations

Under CERCLA Section 121 and the NCP, remedies selected for Superfund sites are required to be protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a waiver is justified), be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the

maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the toxicity, mobility or volume of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedy for OU2 meets these statutory requirements.

13.1 Protection of Human Health and the Environment

The selected remedy will reduce or eliminate the risk to human health and ecological receptors by preventing exposure to PCB-contaminated materials and reducing PCB transport into the Kalamazoo River. This will be accomplished through consolidation of residuals, creation of a setback, construction of a new dike and stabilization of existing dikes, installment of erosion control measures, placement of a cap, establishment of institutional controls, and establishment of long-term maintenance and groundwater monitoring. Bank stabilization and erosion control measures will reduce the potential for bank failure and subsequent transport of PCB-contaminated material into Davis Creek and/or the Kalamazoo River. The remedy will also eliminate the potential for direct contact with contaminated materials by physically isolating and containing contaminated materials from adjacent areas and the residuals within the landfills. The long-term effect on riparian habitat will be reduced, as there will be no new installation of sheet pile. Of critical importance to meeting this criterion (prevent bank failure and transport to the river) is construction of the new bank to achieve a separation between surface water and waste and protect the landfill cover and contents from a 100 year flood event.

13.2 Compliance with ARARs

The ARARs and TBCs identified for a site are categorized into three types: chemical-specific, action-specific and location-specific. Chemical-specific ARARs establish the acceptable amounts or concentrations of a chemical that may be found in, or discharged to, the ambient environment. Action-specific ARARs are technology- or activity-based performance or design requirements associated with the potential remedial activities being considered. Location-specific ARARs establish requirements that protect environmentally sensitive areas and other areas of special interest. The primary chemical specific, action specific, and location specific ARARs for the selected remedy are discussed, below, in sections 13.2.1 and 13.2.2. The selected remedy will comply with the identified federal and/or state ARARs listed below. Where acts or statutes are cited for ARARs, it includes the relevant and appropriate promulgated federal or state regulations or rules.

13.2.1 Chemical-Specific ARARs

The primary chemical-specific ARARs for OU2 include:

Federal Chemical-Specific ARARs:

- 40 C.F.R. § 761.61 et seq., TSCA PCB Remediation Waste Rule: The federal regulations in 40 C.F.R. § 761.61 contain standards for the cleanup and disposal of PCB remediation waste. PCB remediation waste is a waste containing PCBs because of a spill, release, or other unauthorized disposal at a concentration equal to or greater than 50 mg/kg.

The remedial alternative selected in this ROD allows the disposal of PCB remediation waste at the A-Site Landfill portion of OU2, by means of the risk-based disposal method provided in 40 CFR § 761.61(c). The U.S. EPA Superfund Program Director, in consultation with the TSCA program, has determined that disposal of PCB-contaminated residuals and/or materials greater than 50 mg/kg at the A-Site Landfill will not pose an unreasonable risk of injury to public health or the environment.

The conclusion that the consolidation and capping disposal method component of the selected remedy does not pose an unreasonable risk of injury to human health or to the environment is supported by all of the data collected in the RI. As an initial matter, most of the PCB-contaminated material that will be disposed of in the A-Site Landfill is not, by definition, PCB remediation waste because the level of PCB contamination is below 50 mg/kg. The contaminated residuals in both landfills have had the opportunity to naturally settle for many years. The base of the contaminated residuals will have had time to dewater and establish a dense low hydraulic conductivity zone. Tests show that the residuals are relatively impermeable. Moreover, the proposed cap will ensure that terrestrial biota are no longer exposed to the PCB-contaminated wastes in the landfill. The sides and slopes of the landfill will be constructed to withstand a 100-year flood event. This construction standard, along with the berm that will be created around both landfills, should ensure that PCB-contaminated materials no longer erode into the Kalamazoo River or Davis Creek.

In summary, at OU2, the low-permeability of paper residuals within the A-Site Landfill, the low-permeability cover, construction of berms, long-term ground water monitoring, long-term maintenance, and institutional controls included in the selected remedy, provide protection to public health and the environment. Moreover, the above listed components of the selected remedy ensure that this alternative will achieve the TSCA ARAR by implementing a risk-based disposal method.

- Federal Water Pollution Control Act (WPCA): This federal statute contains guidelines for establishing test procedures for the analysis of pollutants. This act is applicable for the discharge to the Kalamazoo River of water from all dewatering activities that will occur during the remediation of OU2.
- Clean Water Act, Ambient Water Quality Criteria: The federal Clean Water Act establishes monitoring requirements for the discharge of waste treatment effluents to waters of the United States. Any surface water runoff generated during excavation must meet Federal surface water quality standards before being discharged back to the river.

These standards are applicable to the surface water discharges resulting from excavation and dewatering of soils, sediments, or residuals at OU2.

State Chemical-Specific ARARs:

- Part 201 Environmental Remediation of the NREPA: This State chemical-specific standard, under Part 201 Environmental Remediation of the NREPA, particularly in Sections 2012a and 2012b, specifies that a remedial action shall achieve a degree of protectiveness appropriate for the use of the property. Sections 2012a and 2012b contain health-based soil standards for residential and industrial/commercial land use. Additionally, Part 201 provides for the identification, risk assessment, evaluation, and remediation of contaminated sites within the state. The statute and its rules provide that remedial actions shall be protective of human health, safety and welfare, and the environment of the state. These standards are applicable at OU2.
- Part 31, Water Resources Protection, of the NREPA: Part 31 of the NREPA establishes effluent standards in accordance with the federal WPCA and the CWA, and also establishes rules specifying standards for several water quality parameters including PCBs. Part 31, Water Resources Protection, of the NREPA, would be applicable to the discharge of water from the site to the Kalamazoo River.

13.2.2 Action- and Location-Specific ARARs

The primary action- and location-specific ARARs for OU2 are:

Location-Specific ARARs:

State Location Specific ARARs:

- Part 115, Solid Waste Management, of the NREPA: Part 115, Solid Waste Management, of the NREPA contains regulations regarding the construction, operation, and closure of sanitary landfills, solid waste transfer facilities, and solid waste processing plants.

Action-Specific ARARs:

Federal Action-Specific ARARs:

- Clean Water Act: The CWA establishes site-specific pollutant limitations and performance standards that are designed to protect surface water quality. Types of discharges regulated under the CWA include discharge to surface water, indirect discharge to a publicly owned treatment works (POTW), and discharge of dredge or fill materials to United States waters. This act is relevant to the treatment and discharge of water to the Kalamazoo River or POTW from the dewatering operations.

- Rivers & Harbor Act: The Rivers & Harbor Act prohibits unauthorized obstruction or alteration of any navigable water in the United States (dredging, fill, cofferdams, etc.). It also requires that federal agencies, where possible, avoid or minimize adverse impacts of federal actions upon wetlands and floodplains. Remedial activities, which may require a permit to perform, must be conducted in such a way that they will avoid unacceptable obstruction or alteration of the Kalamazoo River channel.
- The Clean Air Act: The Clean Air Act establishes requirements for constituent emission rates in accordance with national ambient air quality standards. Excavation and cap construction activities will be regulated by the Clean Air Act.
- TSCA: TSCA's PCB Remediation Waste Rule, 40 CFR, Section 761.61 provides the requirements for the disposal of PCB-contaminated wastes, and would therefore be applicable to this remedy.

State Action-Specific ARARs:

- Part 91, Soil Erosion and Sedimentation Control, of the NREPA: This part regulates earth changes, including cut and fill activities which may contribute to soil erosion and sedimentation of surface water. Part 91, Soil Erosion and Sedimentation Control, of the NREPA would apply to any such activity where more than one acre of land is affected or the regulated action occurs within 500 feet of a lake or stream. Part 91 of the NREPA would be applicable to the cap construction activities since these actions could impact the Kalamazoo River, which is less than 500 feet from OU2.
- Part 301, Inland Lakes and Streams, of the NREPA: Part 301, Inland Lakes and Streams, of the NREPA regulates the dredging or filling of lake or stream bottoms. Activities associated with the selected remedy, sediment removal, and berm stabilization are regulated under this part due to the proximity of OU2 to the Kalamazoo River.
- Part 115, Solid Waste Management, of the NREPA: Part 115, Solid Waste Management, of the NREPA contains regulations regarding the construction, operation, and closure of sanitary landfills, solid waste transfer facilities, and solid waste processing plants.
- Part 31, Water Resources Protection, of the NREPA: Part 31, Water Resources Protection, of the NREPA establishes rules regarding water and wastewater discharges. This is applicable for discharge of waters to the Kalamazoo River. Part 31, Water Resources Protection, of the NREPA also includes the rules regarding permit requirements for discharges.
- Part 55, Air Pollution Control, of the NREPA: Rules prohibiting the emission of air contaminants in quantities which have injurious effects on human health, animal life, plant life of significant economic value, and/or property are established in Part 55, Air Pollution Control, of the NREPA. This would be applicable to excavation and cap

construction activities. During the construction of the RA, the total emissions from the entire site shall comply with the secondary risk screening level (SRS�) for PCB. The SRS� for PCB based upon an incremental cancer risk of 1 in 100,000 is 0.02 ug/m³ (micrograms per cubic meter) applied at OU2 perimeter. At a perimeter location where the adjacent property is an industrial property or a public roadway, Rule 225 (3)b allows for compliance with the SRS� multiplied by a factor of 10. Where the adjacent property is not an industrial property or public roadway, the perimeter location shall comply with the SRS�.

- Michigan Occupational Safety and Health Act 154 (MIOSHA): MIOSHA establishes the rules for safety standards in the work place and is applicable to the remediation activities.
- Part 201, Environmental Remediation, of the NREPA: Part 201, Environmental Remediation, of the NREPA provides for the evaluation and remediation of contaminated sites within the state. The U.S. EPA has determined that Part 201, Environmental Remediation, of the NREPA is applicable to OU2. Part 201, Environmental Remediation, of the NREPA requires that remedial actions be protective of human health, safety and welfare, and the environment.
- Part 303, Wetland Protection, of the NREPA: Part 303, Wetland Protection, of the NREPA regulates activities conducted in wetlands as well as mitigation of wetlands.

13.3 Cost Effectiveness

U.S. EPA has determined that the selected remedy for OU2 is cost effective. A cost-effective remedy in the Superfund program is one where the costs are proportional to the overall effectiveness of the remedy. U.S. EPA evaluated the overall effectiveness of the potential remedial alternatives for OU2 presented in the FFS by evaluating the following three criteria: long-term effectiveness and permanence, reduction in toxicity, mobility and volume through treatment, and short-term effectiveness. U.S. EPA then compared the overall effectiveness to cost to determine whether an alternative is cost effective. Of the remedial alternatives evaluated for OU2, Alternative 2C (the selected remedy) provides a high degree of overall effectiveness, and it is cost effective compared to the other alternatives that provide the same degree of effectiveness. Alternative 2C costs 75 percent less than Alternative 3, which is complete removal and off-site disposal, and 26 percent less than Alternative 4, which reduces the footprint of the landfill by removing the Willow Boulevard Landfill and consolidating the residuals into the A-Site Landfill. Alternatives 2A, 2B, and 2C provide the same degree of overall effectiveness, but Alternative 2C is 12 percent less than Alternative 2A, and 8 percent less than Alternative 2B.

13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

U.S. EPA believes that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practical and cost-effective manner at OU2, and represents the best balance of trade-offs among the alternatives with respect to the primary balancing criteria. Treatment technologies are not a component of the selected remedy because it would be impracticable and not cost-effective to treat the PCB-contaminated material when a suitable and protective onsite containment option, the A-Site Landfill, is available for use at OU2. As discussed in Section 10.0 of this ROD, the selected remedy (Alternative 2C) provides a high degree of long-term protectiveness and represents a permanent solution for OU2 while being cost-effective.

13.5 Preference for Treatment as a Principal Element

As discussed in Section 11, there are no principal threat wastes at OU2. Therefore, U.S. EPA's statutory preference for treatment of principal threats does not apply.

13.6 Five-Year Review Requirements

Because the remedy selected in this ROD will result in hazardous substances, pollutants or contaminants remaining at OU2 above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

14.0 Documentation of Significant Changes

The Proposed Plan for OU2 was released for public comment on July 15, 2005. The Proposed Plan identified the preferred alternative as Alternative 2C - Consolidation and Containment of Select Materials, Re-Grade/Stabilize Banks using Ecologically Friendly Materials with a Setback at Willow Boulevard Landfill. The existing A-Site sheet piling will be retained under this remedy. U.S. EPA reviewed all written and verbal comments submitted during the public comment period and determined that no significant changes to the selected remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

PART III: RESPONSIVENESS SUMMARY

1.0 Background

The United States Environmental Protection Agency (U.S. EPA) met the public participation requirements of Section 113(k)(2)(I-v) and 117 of CERCLA during the remedy selection process for the Willow Boulevard/A-Site Landfill Operable Unit 2 (OU2). These sections require U.S. EPA to respond "...to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on U.S. EPA's proposed cleanup plan for a site. This responsiveness summary addresses the comments and concerns expressed by state agencies, community groups, residents and the Potential Responsible Party (PRP) in written and oral comments during the public comment period for OU2.

1.1 Information Repository

The U.S. EPA maintains information repositories containing the administrative record file for the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site and other site documents and reports at several locations (Table 1). U.S. EPA also maintains an administrative record file for the site at the U.S. EPA Region 5 Superfund Division Records Center, 77 W. Jackson, Chicago, Illinois, 60604. The public can access all major reports and documents about OU2 and the other operable units of the site at these repositories. U.S. EPA also posts information about the Allied Paper Inc./Portage Creek/Kalamazoo River site on the internet at www.epa.gov/region5/sites and www.epa.gov/region5/sites/kalproject.

Information Repositories/Administrative Record Locations for Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site (OU1 -OU7)

Kalamazoo Public Library, 315 South Rose, Kalamazoo, MI
Waldo Library, Western Michigan University, 1903 West Michigan Avenue, Kalamazoo, MI
Charles Ransom Library, 180 South Sherwood, Plainwell, MI
Otsego District Library, 219 South Farmer Street, Otsego, MI
Allegan Public Library, 331 Hubbard Street, Allegan, MI
Saugatuck-Douglas Library, 10 Mixer Street, Douglas, MI

A complete index of all the documents in the administrative record for OU2 is included in Appendix A of this ROD. The public may request an electronic copy (CD format) of the entire administrative record file, or specific documents in the administrative record from the U.S. EPA Region 5 Superfund Division Records Center.

1.2 Public Notices, Fact Sheets and Public Comment Period

U.S. EPA mailed fact sheets outlining the proposed cleanup plan for OU2 to local residents and other interested parties on U.S. EPA's community involvement mailing list on July 15, 2005. U.S. EPA announced its proposed plan for OU2 and invited the public to comment on its plan in a notice in the Kalamazoo Gazette on July 26, 2005. The notice in the Kalamazoo Gazette included information about U.S. EPA's proposed cleanup for OU2, the other remedial alternatives that U.S. EPA considered, the upcoming public meeting, the availability of OU2 documents in the information repositories and the public comment period. U.S. EPA also posted a copy of the OU2 proposed plan on the internet with the other information about the Allied Paper Inc./Portage Creek/Kalamazoo River site at www.epa.gov/region5/sites/kalproject.

The initial public comment period for the OU2 cleanup plan was from July 15, 2005 to August 15, 2005. During the comment period, U.S. EPA received several requests to extend the comment period. As a result, the comment period was extended to September 16, 2005. U.S. EPA published notices announcing the public comment period extension in the Kalamazoo Gazette on August 14, 2005 and in the Allegan County News on August 18, 2005.

1.3 Public Meeting and Hearing

U.S. EPA presented its proposed plan to residents, local officials, community groups and other interested parties at a public meeting on August 3, 2005. U.S. EPA discussed the other remedial alternatives that U.S. EPA considered at the meeting and answered questions about the site. The public meeting was held at the Kalamazoo Public Library in Kalamazoo. About 13 people attended the meeting including representatives from the MDEQ, the Lakewood Neighborhood Association (LNA) and the Kalamazoo River Protection Association (KRPA). A public hearing followed the meeting, during which U.S. EPA accepted oral comments on its proposed plan. A court reporter transcribed the oral comments, and this transcript and the written comments U.S. EPA received during the comment period are part of the administrative record for OU2.

2.0 Summary of Public Comments

U.S. EPA received 6 oral comments and 29 written comments on its proposed plan for OU2. The comments were submitted by government agencies including the Kalamazoo River Trustee Council for Natural Resource Damage Assessment and Restoration (Trustee Council) and the MDEQ; community groups including the Kalamazoo Environmental Council (KEC), the Kalamazoo River Watershed Council (KRWC), KRPA, and the LNA; Georgia Pacific, the PRP for OU2; and other interested parties.

About three-fourths of the comments, including comments from the Trustee Council, the KEC, KRWC and the KPRA, support a cleanup plan for OU2 (referred to in this Responsiveness Summary as Alternative 5) that was not evaluated in the Michigan Department of Environmental Quality's (MDEQ) Remedial Investigation/Focused Feasibility Study (RI/FFS) and that was not considered by the U.S. EPA. MDEQ concurs with Alternative 2 together with bank stabilization

option C (Sub-Alternative 2C) as the selected remedy for OU2, but it also supports Alternative 5 as a way to most efficiently combine remediation with the Trustee Council's restoration goals.

Although there were some variations, Alternative 5 basically contains some elements of Alternative 4 and Sub-alternatives 2B and 2C, and it includes:

- Moving the PCB-contaminated material from the Willow Boulevard Landfill to the A-Site Landfill, and
- Removing the sheet pile at the A-Site Landfill and pulling back the A-Site Landfill waste to create a clean setback or "buffer zone" from the Kalamazoo River with an ecologically-friendly dike.

Alternative 5 variations include:

- Specifying the setback width at the A-Site Landfill of 150 feet;
- Installing a leachate/groundwater collection system;
- Removing the most contaminated materials or "hot spots" for off-site disposal at a Toxic Substances and Control Act (TSCA) landfill;
- Dredging river sediments between OU2 and the King Highway Landfill Operable Unit;
- Several comments specified a cleanup level of 0.3 mg/kg PCB;
- Using hydraulic dredging and Geotube containment for sediment transport;
- Vaulting and covering the A-Site Landfill with long-term protective synthetic geomembranes, concrete, and natural layers of soil to prevent surface runoff;
- Designing the remedy to remain effective for 50 years or longer and to withstand a 100- year flood event or any conceivable flood event; and
- Installing a concrete barrier around Davis Creek.

For the other remedial alternatives, five comments supported U.S. EPA's proposed cleanup remedy (Sub-alternative 2C); one comment supported Alternative 3 (complete excavation and off-site disposal); and one comment supported Alternative 4 (excavate OU2, consolidate, and contain the OU2 materials at the A-Site Landfill underneath a cap).

Additional comments from residents, community groups and other interested parties about U.S. EPA's proposed plan and the final selected remedial action include:

- Objections to U.S. EPA allowing landfills next to rivers/leaving PCB-contaminated material in a floodplain;
- Objections to disposing PCB-contaminated material from the Georgia-Pacific Kalamazoo Mill and former Hawthorne Mill properties at the A-Site Landfill;
- Challenging U.S. EPA's use of a TSCA waiver;
- Stabilizing/solidifying PCB-contaminated materials prior to land-filling;
- U.S. EPA's plans for a 500 year flood event or flood events greater than a 100 year flood event;

- Truck traffic through the residential area and possible health effects from wind-borne material;
- Fencing concerns;
- Concerns about designing the ecologically-friendly dike;
- The likeliness of any short-term effects from excavating the landfills as long as proper procedures are followed;
- Uncertainties about groundwater contributing PCBs to the river, groundwater monitoring and frequency;
- Ensuring Georgia-Pacific provides long-term maintenance;
- Implementing deed restrictions;
- Safety to people in adjacent neighborhoods; and
- Ensuring PCB-contaminated materials will not enter the St. Joseph River during the cleanup.

Other comments from residents, community groups and other interested parties addressed:

- Health concerns;
- Concerns about the cleanup taking so long; further studies being pointless and useless;
- Utilizing Natural Resource Damage Assessment monies to remediate natural resource damages simultaneously with the cleanup; making Natural Resource Damage Assessment dollars attributable to OU2 a part of the final ROD and settlement so the public and stakeholders will have final resolution for this stretch of river;
- Deadlines for U.S. EPA to reach agreements with Georgia-Pacific on OU2 and the Kalamazoo and former Hawthorne Mill properties;
- Ensuring Fish Consumption Advisory Pamphlets are in clear view and readily available at meetings;
- Requiring Georgia-Pacific to regularly inspect and maintain fish advisory signs along the river;
- Checking that the administrative record is up to date in all information repositories;
- Economic consequences of PCB contamination in the river; cleaning up the Kalamazoo River in an appropriate and timely manner so that people can eat fish from the river;
- Removing the dams from the Kalamazoo River to allow safe passage along the river;
- Request to open the King Highway Landfill ROD to provide a natural buffer between the river and the King Highway Landfill;
- Making more information available to the public; and
- Comments that PCBs do not cause cancer and that the negative effects of PCBs on Kalamazoo River wildlife has been exaggerated.

Comments from the PRP included:

- Applying the 0.33 mg/kg PCB default sediment criteria protective of fish consumption to surface soil and other areas infrequently inundated;
- Rewording the description of historical disposal activities at OU2;

- Allowing the limited use of sheet pile along OU2 where erosive forces of the river are present;
- The benefits and drawbacks of environmentally friendly techniques;
- Setback width and how the width of the setback will be determined;
- No further investigation and remediation of the AMW-3A area; and
- Not specifying a contingent groundwater remedy in the ROD.

A summary of the comments U.S. EPA received during the public comment period and U.S. EPA's responses are below. The comments and U.S. EPA's responses are addressed in three sections:

- 1) Community comments on U.S. EPA's proposed plan and cleanup (Section 2.1)
- 2) Other community comments and concerns (Section 2.2)
- 3) PRP comments (Section 2.3).

2.1 Proposed Plan and Cleanup Comments (PP/C Comments)

Comment PP/C-1: *EPA should select a cleanup remedy that fully restores the floodplain at the WB site and restores the bank around the A-Site to more natural conditions. Although there are some variations Alternative 5 contains elements of Alternative 4, Alternative 2B and Alternative 2C. Alternative 5 involves moving the PCB-contaminated material from the WB site to the A-Site, removing the sheet pile at the A-Site, pulling back the A-Site waste to create a clean setback or "buffer zone", and constructing an ecologically-friendly dike around the A-Site. Alternative 5 would be an effective way to combine remediation with the Trustee Council's restoration goals for the site, would provide additional habitat along the river, and would be more aesthetically pleasing.*

U.S. EPA Response PP/C-1: U.S. EPA appreciates the public's development and support of Alternative 5. Alternative 5 is supported by about three-fourths of the comments including comments from the Trustee Council, the KEC, KRWC and the KPRA. The MDEQ concurs with Sub-alternative 2C as the selected remedy for OU2 but also supports Alternative 5 as a way to most efficiently combine remediation with the Trustee Council's restoration goals.

U.S. EPA gave Alternative 5 serious consideration before selecting Sub-alternative 2C as the OU2 remedy. U.S. EPA's analysis is below.

Sub-alternative 2C and Alternative 5 both use containment to reduce the mobility of contaminants to the environment. Both alternatives protect human health and the environment and comply with ARARs. Both alternatives rely on institutional controls, monitoring, and long-term maintenance to achieve long-term effectiveness and permanence. By removing contaminated materials from the saturated zone at the Willow Boulevard Landfill, Alternative 5 would eliminate potential impacts to the Kalamazoo River through groundwater transport in this area. However, groundwater samples collected from a replacement well (WMW-3AR) at the Willow Boulevard Landfill during the most recent sampling event (2000) did not contain any

PCBs. The long-term groundwater monitoring included with Sub-alternative 2C will detect whether any PCBs are mobilizing in groundwater. If contaminants are present in groundwater at concentrations that present a risk to public health or wildlife, then a groundwater cleanup remedy may be required, but that remedy will be done under a separate U.S. EPA action.

Large-scale excavation below the water table makes Alternative 5 less implementable than Sub-alternative 2C. Short-term risks associated with excavating and transporting the Willow Boulevard material to the A-Site Landfill would also be higher with Alternative 5 than Sub-alternative 2C. These risks however, could be minimized through proper work practices and controls. The cost tables for Sub-alternatives 2B and 2C and Alternative 4 in the RI/FFS indicate that Alternative 5 would cost about \$2 million to \$3 million more than Sub-alternative 2C.

U.S. EPA agrees that Alternative 5 would be an effective way to integrate the Trustee Council's restoration goals with the site cleanup. Removing the sheet pile at the A-Site Landfill would also create more natural conditions along this section of the river and be more aesthetically pleasing to the community. However, CERCLA and the NCP do not give U.S. EPA the legal authority to select cleanup remedies based on restoration objectives or aesthetics. U.S. EPA's legal authority is limited to protecting human health and the environment and to selecting remedies consistent with U.S. EPA's evaluation criteria.

U.S. EPA is selecting Sub-alternative 2C as the remedy for OU2 because Sub-alternative 2C meets U.S. EPA's threshold criteria for selected remedies (i.e., must protect human health and the environment and comply with ARARs) and provides the best balance of tradeoffs among EPA's balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; short-term effectiveness, implementability and cost). The MDEQ supports Sub-alternative 2C as the selected remedy for OU2. Community acceptance, while an important consideration to U.S. EPA, is a modifying, not a primary balancing criteria. Because Sub-alternative 2C meets the remedial action objectives for OU2 and meets U.S. EPA's evaluation criteria at a significantly lower cost than Alternative 5, U.S. EPA cannot select Alternative 5 as the OU2 remedy.

U.S. EPA cannot require a remedy to meet the Trustee Council's restoration goals or be aesthetically pleasing but agrees that it would be more cost-effective for the PRP to integrate the Trustee Council's restoration goals into the final remedial design and construction. U.S. EPA is willing to work with the PRP and the Trustee Council during the remedial design phase of the remedy to develop a final design that incorporates the Trustee Council's restoration objectives and meets or exceeds the requirements of the OU2 ROD and Consent Decree

Comment PP/C-2: *The ROD should specify a setback width of 150 feet or of 100 to 200 feet.*

U.S. EPA Response PP/C-2: U.S. EPA does not agree with this comment. U.S. EPA's remedial action objectives are to provide long-term protection of human health and the environment and to comply with ARARs. At the Willow Boulevard Landfill, this will be done by physically separating the waste from the river and protecting the landfill cap and underlying

waste from a 100 year flood event. U.S. EPA has not determined the setback width needed to meet these requirements. The final setback width will be determined during the remedial design using the procedures, calculations and/or approaches in the U.S. EPA-approved Remedial Design Work Plan or other U.S. EPA-approved planning documents, developed during the remedial design phase of the remedial action. The final setback width may be 50 feet, 100 to 200 feet or something more or less. The final setback width will be approved by U.S. EPA in consultation with MDEQ prior to construction. As indicated in U.S. EPA Response PP/C-1, U.S. EPA's selected remedy (Sub-alternative 2C) includes leaving the sheet pile at the A-Site Landfill in place. A setback will not be required at the A-Site Landfill.

Comment PP/C-3: *EPA's selected remedy should include a leachate/groundwater collection system.*

U.S. EPA Response PP/C-3: U.S. EPA disagrees with this comment. Most of the waste at OU2 is above the water table, and the waste will be physically separated from the river by a clean fill setback at the Willow Boulevard Landfill, and by sheet pile, clean fill and bank stabilization at the A-Site Landfill. The low permeability cover system to be constructed over the landfills will further reduce infiltration of precipitation through the residuals over time, thereby reducing the potential for leachate generation and groundwater transport of PCBs and the other chemicals detected in site groundwater above MDEQ generic GSI criteria. U.S. EPA's selected remedy includes long-term groundwater monitoring. If contaminants are present in groundwater at concentrations that present a risk to public health or wildlife, then a groundwater cleanup remedy, which may include the installation of a leachate/groundwater collection system, may be required.

Comment PP/C-4: *EPA's selected remedy should include removing the most contaminated material or "hot spots" from the WB landfill and/or A-Site for off-site disposal at a TSCA landfill.*

U.S. EPA Response PP/C-4: U.S. EPA disagrees with this comment. U.S. EPA's selected remedy was developed and will be designed to protect human health and the environment from all PCB-contaminated material at OU2 and to comply with ARARs. Contaminated material, including hot spots, will be physically isolated underneath a landfill cap thereby eliminating the potential exposure to people. TSCA regulations, which apply to PCB-contaminated material equal to or greater than 50 mg/kg, allow the use of a risk-based disposal method for PCBs (see 40 CFR § 761.61(c)). The U.S. EPA Region 5 Superfund Division Director, in consultation with the TSCA program, determined that disposal of remediation waste at the A-Site Landfill will not pose an unreasonable risk of injury to public health or the environment. See the Declaration in Part I of this ROD.

Comment PP/C-5: *The river materials between the WB/A-Site and the Kings Highway landfill or past the Kings Highway landfill should be dredged as part of the OU2 remedy. Several comments specified a cleanup level of 0.3 mg/kg.*

U.S. EPA Response PP/C-5: U.S. EPA does not agree with this comment. This ROD addresses the contamination at OU2 and adjacent areas. U.S. EPA will determine cleanup levels and appropriate remedial action for Kalamazoo River sediments in the ROD for OU5.

U.S. EPA's selected remedy for OU2 includes excavating contaminated sediment and soils in wetland areas located adjacent to the landfills including the Area South of A-Site Berm, the Willow Drainageway Area, and the Area East of Davis Creek. A sediment cleanup level of 0.33 mg/kg PCB will be applied to wetland areas that are inundated with water for a period of time such that the sediment-to-fish-to-consumer (people and mink) exposure pathway presents an unacceptable risk to consumers of fish. A scientifically valid indicator of wetland inundation period will be established during the design phase of the remedial action in order to determine where a sediment-to-fish-to-consumer exposure pathway in OU2 wetland areas presents an unacceptable risk to consumers of fish.

Comment PP/C-6: *Hydraulic dredging would allow the use of Geotube containment for transporting the most contaminated sediments.*

U.S. EPA Response PP/C-6: Geotubes are used for dewatering sediments with high water content. The remedy for OU2 does not involve dewatering of sediments. Sediments that will be removed as part of the OU2 remedy will be primarily from wetland areas that are seasonally inundated with flood water. The specific methods for excavating paper waste, sediment, and/or soil in adjacent wetland areas will be determined during the remedial design of the remedy and approved by U.S. EPA in consultation with the MDEQ. The sediments will be excavated and transported using methods that will minimize both the generation of contaminated air-borne dust, and the potential for contaminants to erode or be suspended during excavation.

Comment PP/C-7: *The landfills should be vaulted and covered with long-term protective synthetic geomembranes, concrete and natural layers of soil to assure no surface water runoff.*

U.S. EPA Response PP/C-7: The specific details of the landfill cap designs and materials to be used will be developed during the remedial design phase of the remedy and approved by U.S. EPA in consultation with the MDEQ. The cap will be designed with a flexible membrane liner. The flexible membrane liner (FML) would be supported by a 6 inch gas venting layer/soil cushion and protected by a minimum 2 foot soil drainage layer. The 2 foot drainage layer would provide lateral drainage of precipitation, minimize frost penetration into the cover system, and protect the FML from root penetration, ultraviolet light, and other degradation. The drainage layer would be covered by a minimum 6 inch top soil layer capable of supporting native plant growth. The sides and slopes of the landfill caps will be designed to withstand a 100 year flood event and ensure that drainage and surface water runoff is appropriately directed. The landfill caps will physically isolate and contain the contaminated material and reduce the potential for PCBs to migrate (by surface water runoff or erosion) from the landfill into the Kalamazoo River.

Comment PP/C-8: *EPA's selected remedy should be designed to be effective for 50 years or longer and to withstand a 100 year flood event or any conceivable flood event.*

U.S. EPA Response PP/C-8: The ROD requires that the OU2 remedy be designed to withstand a 100 year flood event and comply with all ARARs. During the design phase, the PRP may propose to use materials that are more durable than required and/or a design that will withstand a flood event greater than 100 years. U.S. EPA may approve such PRP proposals as long as the design remains consistent with the ROD. The selected remedy also includes regular maintenance and monitoring to ensure the remedy remains protective of human health and the environment over the long-term. The specific details concerning the remedy design, site inspections and maintenance will be developed during the remedial design phase of the remedy and approved by U.S. EPA in consultation with the MDEQ. The U.S. EPA conducts a statutory review of the site every five years to ensure the remedy remains protective of human health and the environment. U.S. EPA's first five-year review for OU2 will be five years from the start of construction.

Comment PP/C-9: *EPA should not allow landfills next to a river or select a remedy that leaves PCB-contaminated material in a floodplain. In 2001 almost 600 citizens, 28 community and environmental organizations and 22 local governments and officials advised EPA and MDEQ that the PCBs should be moved from the banks of the Kalamazoo River and stored in landfills outside the 500 year floodplain. A cap in a floodplain is not a long-term solution.*

U.S. EPA Response PP/C 9: U.S. EPA does not agree with this comment. U.S. EPA is not allowing new landfills to be constructed at OU2. U.S. EPA is working to physically isolate and contain the contaminated material at the two landfills that were constructed next to the river more than 40 years ago. The U.S. EPA, with concurrence from MDEQ, evaluated different cleanup alternatives including complete excavation and off-site disposal (Alternative 3) and pulling back the waste from the river's edge at both the Willow Boulevard and A-Site landfills (Sub-alternative 2B). U.S. EPA could not select Sub-alternative 2B or Alternative 3 as the OU2 remedy because Sub-alternative 2C is as equally protective of human health and the environment and is as compliant with ARARs as Sub-alternative 2B and Alternative 3, but the cost of Sub-alternative 2C is significantly lower (\$11.5 million for Sub-alternative 2C) compared to \$46 million for Alternative 3 and 12.7 million for Sub-alternative 2B.

Comment PP/C-10: *EPA should not allow the PCB-contaminated material from the Georgia Pacific Kalamazoo Mill and Hawthorne Mill sites to be disposed at the A-Site.*

U.S. EPA Response PP/C 10: U.S. EPA does not agree with this comment. The Georgia Pacific Kalamazoo Mill and Hawthorne Mill (OU7) are in close proximity to OU2 and are part of the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site. Coordinating cleanups between OU2 and OU7 is a timely and cost-effective way to address the contamination at the mill properties and meet overall project goals for the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site. The estimated 35,000 cubic yards of PCB-contaminated material excavated from the mill properties would add approximately 1 foot of material to the A-Site Landfill. U.S. EPA will still require the A-Site Landfill to meet all requirements in the OU2 ROD.

Comment PP/C-11: *How can EPA justify a TSCA waiver for wastes being brought to the A-Site from the Georgia Pacific Kalamazoo Mill and Hawthorne Mill sites? The waste would not be treated (stabilized/solidified) and could cause PCBs to leach into the groundwater and the Kalamazoo River. The exemption criteria in 40 CFR § 761.75 is not being met. The proposed disposal of these soils at the A-Site does not meet the technical requirements in 40 CFR § 761.75(b) because the hydrogeologic conditions are not being met, and a leachate collection system is not being installed as required by 40 CFR § 761.75(b)(7).*

U.S. EPA Response PP/C-11: The TSCA ARAR applicable to disposal of remediation waste at the A-Site Landfill is 40 C.F.R. § 761.61(c), which allows the use of a risk-based disposal method for regulated PCB-contaminated material. The Superfund Division Director has determined that the requirements of 40 C.F.R. § 761.61(c) have been met and that disposal of remediation waste at the A-Site Landfill will not pose an unreasonable risk of injury to human health or the environment.

If U.S. EPA reaches an agreement with Georgia Pacific, then the Kalamazoo Mill and Hawthorne Mill cleanup will be conducted as a separate action under U.S. EPA removal authority, not as part of the WB/A-Site ROD. U.S. EPA's authority to conduct the OU6 removal action, the details of the action, and a discussion of ARARs for the removal will be documented in a U.S. EPA report called an Action Memorandum.

Any mill wastes disposed of at the A-Site will be contained on top of the existing landfill materials above the water table and will be physically separated from the Kalamazoo River. The low permeability cover system constructed over the A-Site will reduce the potential for leachate generation and groundwater transport for PCBs from all landfilled material. Long-term groundwater monitoring will detect any contaminants in leachate and groundwater so U.S. EPA can take appropriate action. See U.S. EPA Response PP/C-4.

Comment PP/C-12: *PCB-contaminated materials should be stabilized/solidified prior to landfilling.*

U.S. EPA Response PP/C-12: Long-term groundwater monitoring will be conducted. The specific details of the remedial action for OU2 will be developed during the remedial design phase of the remedy and will be approved by U.S. EPA in consultation with the MDEQ. Any excavation and disposal of PCB-contaminated material will comply with all ARARs. Excavated materials may need to be dewatered, stabilized or solidified to allow for compaction and cap construction but this is not a specific requirement of the ROD. The OU2 remedy does not require that the excavated PCB materials to be stabilized/solidified because the materials are not high enough in water content to warrant such a requirement. The OU2 remedy consists of consolidating PCB contaminated material and placing this material on top of the existing A-Site Landfill residuals, which are above the water table. The waste will be physically separated by the existing sheet pile and the clean fill between the sheet pile and the waste at the A-Site Landfill, and by the setback at the Willow Boulevard Landfill. The low permeability cover

system constructed over the landfills will reduce the potential for leachate generation and groundwater transport of PCBs into the Kalamazoo River.

Comment PP/C-13: *What plans will be developed to address a 500 year flood event or any flood/rain event over the 100 year threshold?*

U.S. EPA Response PP/C-13: The OU2 ROD requires that the landfill cap and its contents be protected against a 100 year flood event. The specific details of the site inspection and maintenance plans will be developed during the remedial design and approved by U.S. EPA in consultation with the MDEQ. A detailed Operation and Maintenance Plan will be submitted to U.S. EPA during the design phase of the remedy. This plan will include provisions for addressing flood and rain events that could have an immediate effect on the function and protectiveness of the remedy and a schedule for making appropriate repairs (e.g., setback requires additional fill, ecologically-friendly dike or stabilized banks require repairs to ensure the protectiveness of the remedy.)

Comment PP/C-14: *EPA's selected remedy should include a concrete barrier around Davis Creek.*

U.S. EPA Response PP/C-14: U.S. EPA disagrees with this comment. U.S. EPA believes that the existing sheet pile at the A-Site Landfill and stabilizing the banks along Davis Creek in areas where sheet pile is not present will protect human health and the environment and will protect against a 100 year flood event. Along Davis Creek, bank stabilization in U.S. EPA's ROD includes limited excavation and re-grading of dike soils to attain a stable slope and placing rip-rap along the bottom of the dike to prevent erosion. U.S. EPA does not believe a concrete barrier is necessary to protect human health and the environment. If U.S. EPA determines that the stabilized banks are not functioning as intended then U.S. EPA may require other methods of bank stabilization, which could include the use of concrete.

Comment PP/C-15: *If the waste from the Georgia Pacific Kalamazoo Mill and Hawthorne Mill sites is disposed at the A-Site residents will have to endure noise and traffic from over 1,750 trucks going past their homes. Assuming 3 trucks per hour over a 40 hour work week would mean a total of 72 days or 14 weeks of truck traffic. Please show on a map what route the trucks will take. Residents south of the site will not want this additional waste in their area. The wastes from the mill sites should be disposed at a permitted treatment storage and disposal facility or treated by stabilization/solidification prior to landfilling at the A-Site.*

U.S. EPA Response PP/C-15: If U.S. EPA reaches an agreement with Georgia Pacific, then the Kalamazoo Mill and Hawthorne Mill cleanup will be conducted as a separate action under U.S. EPA removal authority and will be documented in an U.S. EPA report called an Action Memorandum. The specific details of the removal action and how the action will be conducted, including the proposed truck route, will be developed in the removal reports and approved by U.S. EPA. A Battle Creek resident submitted this comment, and none of the comments U.S.

EPA received from residents near the site expressed any objections to the mill waste being brought to the A-Site Landfill.

Comment PP/C-16: *Any fence along the river corridor should be hidden from view.*

U.S. EPA Response PP/C-16: The purpose of the fence is to prevent trespassers and recreational users from coming into contact with the landfill materials and/or compromising the integrity of the landfill cover and remedy components. The fence must be designed and located consistent with the requirements of Michigan NREPA Part 115 (Solid Waste Management). The exact placement of the fence will be determined during the remedial design and approved by U.S. EPA in consultation with the MDEQ. During the design U.S. EPA will try to have the fence located in an area that is less visible from the river, but U.S. EPA will not be able to do this if it is not protective, is cost-prohibitive, or will not comply with ARARs.

Comment PP/C-17: *What will the ecologically-friendly dike look like? EPA should ensure this is properly designed.*

U.S. EPA Response PP/C-17: Ecologically friendly dikes are made of natural materials and provide a more natural appearance and transition to the surrounding environment. Ecologically friendly dikes are usually more affordable than standard dikes although they may require more maintenance. Ecologically friendly dikes provide increased wildlife habitat and are more aesthetically pleasing. The ecologically friendly dike at OU2 may include:

- Shallow bank slopes that rise gently back from bank-full elevations. The shallow banks would help ensure the stability of the natural materials that cannot withstand the same erosive forces as steeper hard-lined banks;
- Live plantings such as grass, seeded erosion control blankets, immature trees including willow trees and red-osier dogwood;
- Log revetments - covering the bottom of the river bank with large logs, sometimes with limbs left intact to provide in-stream cover or refuge; and/or
- Log lunkers - engineered stream overhangs that protect banks against higher flows, provide in-stream cover, and protect aquatic habitat during normal or low flow.

The specific elements of the ecologically friendly dike at OU2 will be developed during the remedial design phase of the remedy and will be reviewed and approved by EPA in consultation with MDEQ.

Comment PP/C-18: *The short-term risks associated with Alternatives 3 and 4 are overstated. Any short term risks from excavating the landfills can be minimized through proper work practices and controls.*

U.S. EPA Response PP/C-18: U.S. EPA agrees that any short-term risks from excavating the landfills can be minimized through proper work practices and controls and by complying with ARARs. However, U.S. EPA is required to compare cleanup alternatives against nine evaluation

criteria including short-term effectiveness. U.S. EPA's analysis is clear that cleanup alternatives requiring no or significantly less excavation (Alternative 1 and Sub-alternatives 2A, 2B, and 2C) pose less short-term risks than those alternatives requiring more excavation (Alternative 3 and Alternative 4) even though those risks would be minimized as much as possible. U.S. EPA did not select Sub-alternative 2C because Sub-alternative 2C poses less short-term risks than Alternatives 3 and 4 (and 5). U.S. EPA selected Sub-alternative 2C because it protects human health and the environment, complies with ARARs, and provides the best balance of tradeoffs with respect to the other primary balancing criteria (long-term effectiveness; reduction of toxicity, mobility or volume through treatment; implementability, short-term effectiveness and cost).

Comment PP/C-19: *There are significant uncertainties and data gaps concerning groundwater transport of PCBs to the Kalamazoo River. EPA's selected remedy should include groundwater monitoring conducted every three months indefinitely.*

U.S. EPA Response PP/C-19: U.S. EPA agrees that groundwater monitoring should be conducted at OU2, and requirements for groundwater monitoring were included in the OU2 ROD. U.S. EPA does not necessarily agree that monitoring will need to be conducted every three months indefinitely. Most of the waste at OU2 is above the water table. Once the landfill materials are physically separated from the river, and the cover system is installed, the potential for leachate generation and groundwater transport will be significantly reduced. U.S. EPA agrees that groundwater monitoring may initially be warranted every 3 months; however, the exact details of the groundwater monitoring plan will be developed during the remedial design phase of the remedy and approved by U.S. EPA in consultation with MDEQ.

Comment PP/C-20: *How will EPA ensure Georgia Pacific will provide long-term maintenance of the WB/A-Site? Who will take over long-term maintenance if Georgia Pacific declares bankruptcy? EPA should require Georgia Pacific to establish a 30 year or more trust fund.*

U.S. EPA Response PP/C-20: U.S. EPA agrees that it is very important for the PRP to provide U.S. EPA with appropriate financial assurances to construct and maintain cleanup remedies over the long-term. There are several different types of financial assurances U.S. EPA may accept. The specific financial assurance Georgia Pacific will provide will be negotiated between U.S. EPA and Georgia Pacific as part of the OU2 Consent Decree. If Georgia Pacific declares bankruptcy U.S. EPA will submit a claim against Georgia Pacific. U.S. EPA's claim will be for Georgia Pacific's obligations under the OU2 Consent Decree and any other legal agreements U.S. EPA has with Georgia Pacific and/or its successors.

Comment PP/C-21: *The OU2 Consent Decree should require Georgia Pacific to implement deed restrictions at the site. EPA should require the deed restrictions to be in place before work starts.*

U.S. EPA Response PP/C-21: Deed restrictions are placed on a property to regulate future land use and to ensure the protection of public health, safety and welfare, and the environment are

adequately protected. The OU2 Consent Decree will require Georgia Pacific to implement the OU2 remedy, and deed restrictions are part of the remedy. U.S. EPA will require Georgia Pacific to implement the deed restrictions in accordance with the time frames negotiated in the Consent Decree.

Comment PP/C-22: *Any cleanup remedy must guarantee the safety of people in nearby neighborhoods.*

U.S. EPA Response PP/C-22: U.S. EPA's cleanup plan will prevent people from being exposed to the contamination at OU2. Contaminated materials in the areas around the landfills will be excavated and contained with the other landfill materials under a low permeability cover system. U.S. EPA's selected remedy includes fencing and warning signs to keep people off of the landfill. The OU2 cleanup will be conducted using methods intended to minimize the generation of contaminated air-borne dust and the potential for contaminants to wash off-site during construction. The cleanup will comply with all federal and state ARARs including the federal Water Pollution Control Act, Clean Water Act, Rivers and Harbors Act, TSCA and the Clean Air Act; and Parts 91 (Soil Erosion and Sedimentation Control), 301 (Inland Lakes and Streams), 31 (Water Resources Protection), 55 (Air Pollution Control) and 115 (Solid Waste Management) 303 (Wetlands Protection) of the Michigan NREPA; and Michigan Occupational Safety and Health Act 154.

Comment PP/C-23: *Little Portage Creek and the Portage River flow into the St. Joseph River. How will EPA ensure PCB-contaminated materials will not enter the St. Joseph River during the WB/A-Site cleanup?*

U.S. EPA Response PP/C-23: OU2 is located along the Kalamazoo River, which flows into Lake Michigan at Saugatuck. Portage Creek (not Little Portage Creek or Portage River) in Kalamazoo is part of the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site and flows into the Kalamazoo River. The Kalamazoo River and Portage Creek are not connected to Little Portage Creek, the Portage River or the St. Joseph River. Any cleanup activities conducted in or along the Kalamazoo River or Portage Creek will not affect the St. Joseph River.

2.2 Other Community Comments and Concerns (CC comments)

Comment CC-1: *A resident living next to the WB/A-site is concerned because a lot of the people in the area have serious heart problems and cancer. The woman had a heart transplant, her son needs a heart transplant and her husband is having heart problems. A lot of the kids who grew up in the area have heart problems and she believes a health study is warranted.*

U.S. EPA Response CC-1: U.S. EPA does not conduct health studies. Health studies are conducted by the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR has 7 criteria for determining whether a health study should be conducted. They are:

- Public health significance

- Community perspective and involvement
- Scientific importance
- Ability to prove definitive results
- Availability of resources
- Contribution to program goals
- Authority and support

A copy of ATSDR's "Guidance for ATSDR Health Studies" is available on ATSDR's website at www.atsdr.cdc.gov. Click on "Index" and then click on the letter "H". The guidance is listed under "Health Studies, Guidance for ATSDR." Requests for health studies may be submitted to:

Dr. David Williamson, Director
 Agency for Toxic Substances and Disease Registry
 Division of Health Studies
 1600 Clifton Rd., NE, Mailstop E-31
 Atlanta, Georgia 30333
 (404) 498-0105 or toll free at 1-888-422-8737

Over 75 surface and subsurface soil samples were collected from residential properties next to the site and analyzed for PCBs. Most of the sample results were non-detect or contained low levels of PCBs well below the MDEQ health based residential criteria of 4 mg/kg. Detected concentrations ranged from 0.12 mg/kg to 1.5 mg/kg. One sample contained PCBs at a concentration of 4.4 mg/kg, just above the MDEQ criteria, but this sample was found to be on property owned by Georgia Pacific. The fence between the properties was relocated and provides a barrier between the residence and sample location.

Comment CC-2: *Why is the cleanup taking so long? It was supposed to be done in 2002. What is being done about this? Further studies are useless.*

U.S. EPA Response CC-2: U.S. EPA agrees that the OU2 cleanup has not been progressing as quickly as U.S. EPA would like. The Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site is a very large, complex site with 80 miles of river, four landfills and contaminated former paper mill properties. OU2 was placed on U.S. EPA's National Priorities List in 1990 and the MDEQ was the lead agency, overseeing the PRP's RI/FFS. In 2001 MDEQ rejected the PRP's RI/FFS and took over completing the report. In 2003 the MDEQ completed the human health and ecological risk assessments for the entire Allied Paper Inc./Portage Creek/Kalamazoo River site. The MDEQ finished the OU2 RI/FFS in November 2004. U.S. EPA took over the OU2 lead in 2004 when MDEQ finished the RI/FFS. Progress on OU2 may be slow, but OU2 is only one part of the Allied Paper Inc./Portage Creek/Kalamazoo River site. U.S. EPA is working very hard to make cleanup progress at OU2 and in all areas of the 80 mile Superfund Site.

EPA does not agree that further studies, when appropriate, are useless. These studies allow EPA to appropriately assess the risks at the site in a technically sound manner and to develop well-founded cleanup solutions to address the risk.

Comment CC-3: *Natural Resource Damage monies should be utilized simultaneously with the cleanup. Natural Resource Damage dollars attributable to the WB/A-Site should be made part of the final ROD and settlement so the public and stakeholders will have final resolution for this stretch of river.*

U.S. EPA Response CC-3: U.S. EPA agrees that it would be more timely and cost-effective for the PRP to integrate the Trustee Council's restoration goals into the final remedial design and construction. U.S. EPA will notify the Trustee Council when RD/RA negotiations for OU2 begin and invite the Trustee Council to participate in negotiations. U.S. EPA will also provide the Trustee Council an opportunity to review and comment on RD/RA documents. Based on the scope and complexity of the Allied Paper Inc./Portage Creek/Kalamazoo River site and the different PRPs for different parts of the site, the Trustee Council may wish to pursue a separate settlement agreement that may not be complete by the time U.S. EPA is ready to move forward.

U.S. EPA is not a trustee and cannot make natural resource damage settlement dollars part of the ROD. The natural resource trustees for the Kalamazoo River are:

- MDEQ
- Michigan Department of Natural Resources
- Michigan Attorney General
- U.S. Fish and Wildlife Service
- National Oceanic and Atmospheric Administration

Additional information about the Kalamazoo River Trustee Council is available on the internet at www.fws.gov/midwest/kalamazooNRDA or by contacting:

Judith Gapp
Lead Administrative Trustee
Kalamazoo River Environment Trustee Council
Remediation and Redevelopment Division
Department of Environmental Quality
525 West Allegan St.
P.O. Box 30426
Lansing, MI 48909
(517) 373-7402
leemonn@michigan.gov

Comment CC-4: *EPA should establish deadlines for RD/RA negotiations for the WB/A-Site and for negotiating the Administrative Order on Consent (AOC) for the Georgia Pacific Kalamazoo*

Mill and Hawthorne Mill sites. EPA should threaten the PRP with a Unilateral Administrative Order (UAO) if settlements are not reached.

U.S. EPA Response CC-4: U.S. EPA's time frame for negotiating an RD/RA Consent Decree with the PRP is provided in CERCLA and is 120 days from the date U.S. EPA issues a Special Notice Letter (SNL). A SNL is sent to the PRP after the ROD is signed. CERCLA does not provide U.S. EPA with any statutory time frames for negotiating an AOC for a removal action but it is generally takes 30 to 90 days. If U.S. EPA doesn't reach an agreement with the PRP U.S. EPA will consider its other options for addressing the site including conducting fund-financed cleanups and initiating cost recovery actions or issuing a UAO.

Comment CC-5: *The Fish Consumption Advisory Pamphlets were not readily available at the Proposed Plan Public Meeting. Please have the pamphlets available at future meetings and in clear view so the public can easily obtain a copy.*

U.S. EPA Response CC-5: U.S. EPA sincerely apologizes for this oversight and will make every attempt to have the pamphlets available and readily accessible at future meetings.

Comment CC-6: *Why does MDEQ have to pay for the fish advisory signs along the river? EPA should require Georgia Pacific to post and maintain a network of warning signs along the river. The signs should be inspected every month and replaced as needed. Or EPA should pay for the work and recover the costs from Georgia Pacific. This proves that any future cleanup plans to leave PCB-contaminated sediments in place in the river with institutional controls such as warning signs to not eat the fish will not work because the existing controls do not work.*

U.S. EPA Response CC-6: U.S. EPA will require the PRP to post and maintain the signs along the river once U.S. EPA selects a final remedy for the Kalamazoo River (OU5) but only if warning signs are part of the selected remedy. The funds MDEQ are currently spending on the signs are cost-recoverable and U.S. EPA and/or MDEQ can settle with the PRPs for these costs as part of the OU5 RD/RA Consent Decree or through cost recovery actions.

Comment CC-7: *Did EPA check to make sure the administrative record was up to date in all the information repositories or just the Kalamazoo Library? EPA has a legal requirement to keep these files up to date and EPA should check all repositories at least once a year.*

U.S. EPA Response CC-7: The U.S. EPA project manager and the community involvement coordinator try to make sure the information in the repositories is up to date when they are in the area. U.S. EPA's current policy is to scan the administrative record documents into electronic files and provide them to the information repositories on CD. U.S. EPA's contractor confirmed that they sent out CDs with the OU2 administrative record update to all 6 information repositories. U.S. EPA will follow up with the repositories to verify that the CDs were received and are with the rest of the site information.

Comment CC-8: *EPA must cleanup the Kalamazoo River in an appropriate and timely manner so that people can eat the fish from the river. The economic consequences of PCB contamination in the river are significant. The dams along the Kalamazoo River should be removed to allow recreational users safe passage along the river.*

U.S. EPA Response CC-8: U.S. EPA agrees that the Kalamazoo River should be cleaned up, but it is not clear when people will be able to resume fish consumption. An adequate RI/FS for the River OU5 is needed before U.S. EPA can appropriately assess future cleanup solutions to address the risk. U.S. EPA's cleanup plan for the river will be addressed in the OU5 ROD; this ROD addresses OU2. Cleaning up OU2 and the other landfills and mill properties will contribute to the overall river cleanup by preventing additional PCBs from entering the river.

U.S. EPA recognizes the economic consequences of the PCB contamination in the river and these consequences are being considered by the Trustee Council. See U.S. EPA Response CC-3 for additional information about the Kalamazoo River Trustee Council. U.S. EPA does not have the authority to require dams along the Kalamazoo River to be removed to allow recreational users safe passage.

Comment CC-9: *EPA must open the Kings Highway ROD to provide a natural buffer between the river and the Kings Highway Site.*

U.S. EPA Response CC-9: CERCLA and the NCP do not give U.S. EPA the legal authority to open RODs based on restoration objectives or aesthetics. If the PRPs or the Trustee Council propose to provide a natural buffer between the river and the King Highway Landfill as part of their restoration objectives or settlement, U.S. EPA may need to issue an Explanation of Significant Difference or propose a ROD Amendment to the King Highway Landfill ROD.

Comment CC-10: *EPA needs to make more information about the WB/A-Site and the rest of the Allied Paper Inc./Portage Creek/Kalamazoo site available to the public.*

U.S. EPA Response CC-10: U.S. EPA posts information about OU2 and the rest of the Allied Paper Inc./Portage Creek/Kalamazoo site on the internet at www.epa.gov/region5/sites. U.S. EPA also maintains information repositories containing the administrative record documents for OU2 (see Appendix A of this ROD for a list of these documents) and other site records at libraries in Kalamazoo (2 locations), Plainwell, Otsego, Allegan and in Douglas, Michigan. U.S. EPA also maintains an administrative record for OU2 and the Allied Paper/Portage Creek/Kalamazoo River site at the U.S. EPA Region 5 Superfund Division Records Center in Chicago. The public can access all major reports and documents about OU2 and the other operable units of the site at these repositories.

U.S. EPA holds and has attended many meetings and availability sessions with residents, local officials, and community groups at various locations along the river over the past several years. U.S. EPA maintains a mailing list of residents, officials, community groups and other interested parties. U.S. EPA sends out copies of its proposed plans and other fact sheets and updates to the

parties on U.S. EPA's mailing list. U.S. EPA also takes out advertisements in local newspapers to announce fact sheets, comment periods and meeting dates. Additional information about U.S. EPA's community involvement activities for OU2 is described in Sections 1.1 to 1.3 of this Responsiveness Summary. If there are specific questions or if a member of the public would like to be added to the mailing list, please contact:

Shari Kolak
Remedial Project Manager
U.S. EPA Region 5 (SR-6J)
77 W. Jackson
Chicago, IL 60604
(800) 621-8431 ext. 66151
kolak.shari@epa.gov

Don deBlasio
Community Involvement Coordinator
U.S. EPA Region 5 (PA-19J)
77 W. Jackson
Chicago, IL 60604
(800) 621-8431 ext. 64360
deblasio.don@epa.gov

Comment CC-11: *PCBs do not cause cancer and the negative effects of PCBs on Kalamazoo River wildlife has been exaggerated*

U.S. EPA Response CC-11: U.S. EPA considers PCBs a probable human carcinogen based on several peer-reviewed studies. Additional information concerning the ecological effects of PCBs at the Allied Paper Inc./Portage Creek/Kalamazoo River Site can be found in MDEQ's 2003 *Baseline Ecological Risk Assessment Report* (available in the local information repositories) and the Trustee Council's *Stage 1 Assessment Report for the Kalamazoo River Environment* available at www.fws.gov/midwest/kalamazooNRDA.

2.3 PRP Comments (PRP comments)

Comment PRP-1: *The 0.33 mg/kg PCB human health sediment criterion protective of subsistence and sport fish consumption developed in the Human Health Risk Assessment and the 0.5 mg/kg to 0.6 mg/kg sediment criteria in the RI/FFS developed in the Baseline Ecological Risk Assessment are based on a simple model of PCB partitioning between sediment and the overlying water column and bioaccumulation in fish to calculate no-effect and lowest-effect-based preliminary remediation goals. The model does not apply to soils that may be infrequently submerged. There is no defensible scientific basis for applying these sediment criteria to surface soil (at AMW-3A for example) and in other areas infrequently inundated.*

U.S. EPA Response PRP-1: U.S. EPA agrees that the human health sediment (default) criterion of 0.33 mg/kg PCB should not apply to soils at the AMW-3A area. The OU2 ROD does not require the AMW-3A area be cleaned up to 0.33 mg/kg PCB. The OU2 ROD does, however, require the sediment cleanup criterion of 0.33 mg/kg PCB be applied to wetlands that are inundated for a period of time such that a sediment-to-fish-to-consumer (people and mink) exposure pathway presents an unacceptable risk to consumers of fish. For OU2 wetland areas that are inundated for a period of time such that a sediment-to-consumer exposure pathway does not present an unacceptable risk to consumers of fish, then a cleanup level that is within the acceptable NOAEL/LOAEL range of 6.5 mg/kg to 8.1 mg/kg PCB will apply to these wetlands

to protect terrestrial ecological receptors. See Section 7.2 of the OU2 ROD for a more detailed discussion on the application of the sediment criterion of 0.33 mg/kg PCB to wetland areas.

Comment PRP-2: *EPA should consider rewording the description of historical disposal at the WB site. Page 3 of EPA's Proposed Plan indicates that paper residuals disposed at WB were placed directly into the river. This is not accurate. As seen on the attached 1950 aerial photograph channel islands were well-established in this area of the river long before the residuals were disposed. A substantial portion of the residuals was placed over the islands, not into water.*

U.S. EPA Response PRP-2: U.S. EPA's description of OU2 in the Proposed Plan was intended to be consistent with the RI/FFS which states: "The site was built without berms, and residuals were placed directly into the river and floodplain." The language in the RI/FFS should be acceptable to the PRP since the PRP did not dispute or comment on this language in their January 14, 2004 letter titled: *Kalamazoo River Study Group Dispute and Comment to December 2003 RI/FFS*. Cross Section A-A' in Figure 12A of the RI/FFS shows the interior and western portions of the Willow Boulevard Landfill contain residuals up to 7 feet below the water table. This indicates residuals were placed directly into the river in these areas and/or washed into the river in these areas from other site areas. The OU2 description in the ROD states: "The Willow Boulevard Landfill, which was built without berms, also received dewatered residuals from the King Highway lagoons."

Comment PRP-3: *EPA's selected remedy should retain flexibility to allow limited use of sheet pile to protect the ecologically friendly habitat elements of the remedy. EPA's preferred alternative for WB includes an ecologically-friendly dike along the perimeter of the site. However, the northeast area of WB faces upstream and is subject to considerable erosive forces. Ecologically friendly stabilization features are not expected to sufficiently resist the shear stresses and ice flows of the river during extreme events. An engineered structure such as sheet pile along part of the WB site may be necessary to ensure long-term integrity and permanence of the site and adequately mitigate the potential release of PCBs. A figure proposing about 400 feet of sheet pile along the northeast side of WB is attached.*

U.S. EPA Response PRP-3: U.S. EPA does not agree with this comment. Sub-alternative 2C (U.S. EPA's selected remedy) includes a "setback area" or "buffer zone" between the landfill and the river that will be filled with clean material and will physically separate the waste from the river. The setback area will "buffer" the landfill cover, the waste, and the ecologically friendly dike from the erosional forces of the river. The setback distance is assumed to be 50 feet but the actual distance will be determined during the remedial design. Site areas subject to greater erosive forces may need to have a wider setback than other areas and the setback will have to be regularly inspected and maintained, especially after flood events. Regular inspection and maintenance of the landfill cap and dike will ensure the remedy remains protective over the long-term.

Comment PRP-4: *EPA's Proposed Plan provides limited information about the "ecologically-friendly" and "setback" components of EPA's preferred alternative. The comment describes elements that might be included in the remedial design for the WB site including shallow bank slopes, live plantings, log revetments and log lunkers. The comment discusses potential benefits of ecologically friendly techniques and potential problems including an increased chance of failure under extreme flow, the failure of vegetation to establish, increased maintenance and an increased potential for the introduction of foreign habitat or species.*

U.S. EPA Response PRP-4: The specific elements of the ecologically friendly and setback components of the OU2 remedy will be developed during the remedial design and will be reviewed and approved by U.S. EPA in consultation with MDEQ prior to being implemented. U.S. EPA agrees with the potential benefits of ecologically friendly techniques and believes that any potential problems can be minimized through the proper selection, design, construction, inspection and maintenance of remedy components.

Comment PRP-5: *The width of the setback in Alternative 2C is not defined in the FFS or the Proposed Plan. The west side of WB currently has a 20 foot setback (approximate) that was constructed during the Interim Action. This 20 foot setback adequately protects the north and west banks of the backwater area on the west side of the site and should provide sufficient protection against expected erosional forces. The width of the setback along the north and east sides of WB will be determined during the remedial design by assessing bank stability during a 24-hour 25 year rainfall event. The setback width will be presented in the remedial design.*

U.S. EPA Response PRP-5: The width of the setback for Sub-alternative 2C was not defined in the RI/FFS or Proposed Plan because the actual width needed for the setback to be protective has not been calculated and will not be determined until the remedial design. For cost estimating purposes, the RI/FFS assumed a setback width of 50 feet.

Setback widths will be developed during the remedial design along the entire length of OU2 including areas where setbacks have already been constructed. The setbacks will be designed to meet ROD requirements including protecting the landfill cap and underlying waste material from a 100 year flood event, and will be developed using the procedures, calculations and/or approaches in the U.S. EPA-approved Remedial Design Work Plan or other U.S. EPA-approved planning documents. During the remedial design phase of the remedy, U.S. EPA may determine the existing 20 foot setback in the west part of OU2 is adequate or that it needs to be augmented. The final setback widths must be approved by U.S. EPA in consultation with MDEQ prior to construction.

Comment PRP-6: *The Proposed Plan states "the soil in the area near monitoring well AMW-3A may pose an unacceptable risk to people and wildlife...but this area needs further study." The AMW-3A area has been thoroughly characterized by collecting and analyzing 18 surficial soil and 47 subsurface soil samples in residential and industrially zoned areas. Data from AMW-3A area soil samples is in the RI/FFS.*

U.S. EPA Response PRP-6: U.S. EPA does not agree with this comment. The extent of soil contamination above criteria in the AMW-3A area requiring excavation is not fully known and will be determined during the remedial design and/or through confirmation sampling during the remedial action. PCBs were detected above residential criteria in SB-3A-213 toward the south end of the AMW-3A area. However, no samples were collected south or west of this location to determine if soils beyond SB-3A-213 exceed criteria and require excavation. PCBs were also detected above residential criteria in SB-3A-202 at the north end of the AMW-3A area, but no samples were collected between SB-3A-202 and the A-Site Landfill to determine whether the soils in this area exceed criteria and require excavation.

It is not clear why industrially zoned areas are mentioned in this comment. U.S. EPA's understanding is that the AMW-3A area is owned by Kalamazoo Township and Georgia Pacific but is zoned for residential use, making residential criteria applicable. See Figure 14 in the RI/FFS. Figure 14 shows the AMW-3A area to be residentially zoned. The PRP did not dispute or comment on Figure 14 in their January 14, 2004 letter titled: *Kalamazoo River Study Group Dispute and Comment to December 2003 RI/FFS*. If the zoning for the AMW-3A area has changed, please provide U.S. EPA with the updated documentation so that U.S. EPA can make a determination on the appropriate cleanup criteria to be applied at the AMW-3A area.

Comment PRP-7: *The surface soil data for the residential area near AMW-3A yielded an arithmetic mean of 0.18 mg/kg PCBs with a 95% upper confidence limit (UCL) of 0.48 mg/kg. The surface soil data for the industrially zoned area of AMW-3A yielded an arithmetic mean of 1.86 mg/kg PCBs and a 95% UCL of 2.81 mg/kg. In both cases the arithmetic 95% UCL PCB concentration is less than the Part 201 Generic Direct Contact Cleanup Criteria and Screening Levels of 4 mg/kg and 16 mg/kg in soils in residential and industrially-zoned areas. Based on these data there is no unacceptable risk to human health and the AMW-3A area has been sufficiently investigated. The ROD should delete any references to the need for additional investigation and the suggestion the area around AMW-3A poses an unacceptable risk.*

U.S. EPA Response PRP-7: U.S. EPA does not agree with this comment. Risks at OU2 including potential risks in the AMW-3A area were qualitatively assessed to determine which media and areas should be targeted for remediation and/or environmental controls. This was done by comparing maximum concentrations to relevant criteria including MDEQ's health-based Generic Residential Land Use Criteria, which is also an ARAR for this site. Maximum PCB concentrations in surface and subsurface soil in the AMW-3A area exceed residential criteria and pose an unacceptable risk to human health under future residential scenarios. Maximum PCB concentrations in subsurface soil exceed terrestrial criteria and would pose an unacceptable risk to terrestrial receptors if the soil was dug up and brought to the surface. These risks indicate remedial action is warranted in the AMW-3A area.

Comment PRP-8: *The Proposed Plan should not specify a contingency groundwater remedy and should adopt an approach consistent with the King Highway Landfill Operable Unit (KHL-OU). The Proposed Plan does not mention any groundwater risks but includes provisions for a groundwater remedy if monitoring indicates the presence of contaminants at unacceptable*

levels. Including a contingent groundwater remedy as an element of the Proposed Plan is contrary to agreements (attached to this comment) by the MDEQ to develop the WB/A-Site ROD using the groundwater approach in the KHL-OU ROD. The WB/A-Site ROD should only include provisions for groundwater monitoring. The monitoring program in the Hydrogeologic Monitoring Plan should include a contingency plan that identifies a range of potential response actions if groundwater contaminants exceed risk-based criteria. These actions could include a review of groundwater sampling protocols and/or well installation and development methods, statistical analysis of sampling data, resampling, installing new monitoring wells, risk evaluation, and other actions that may include implementing an engineered groundwater remedy. The detection of groundwater contamination at concentrations exceeding target criteria should not immediately trigger a groundwater remedy.

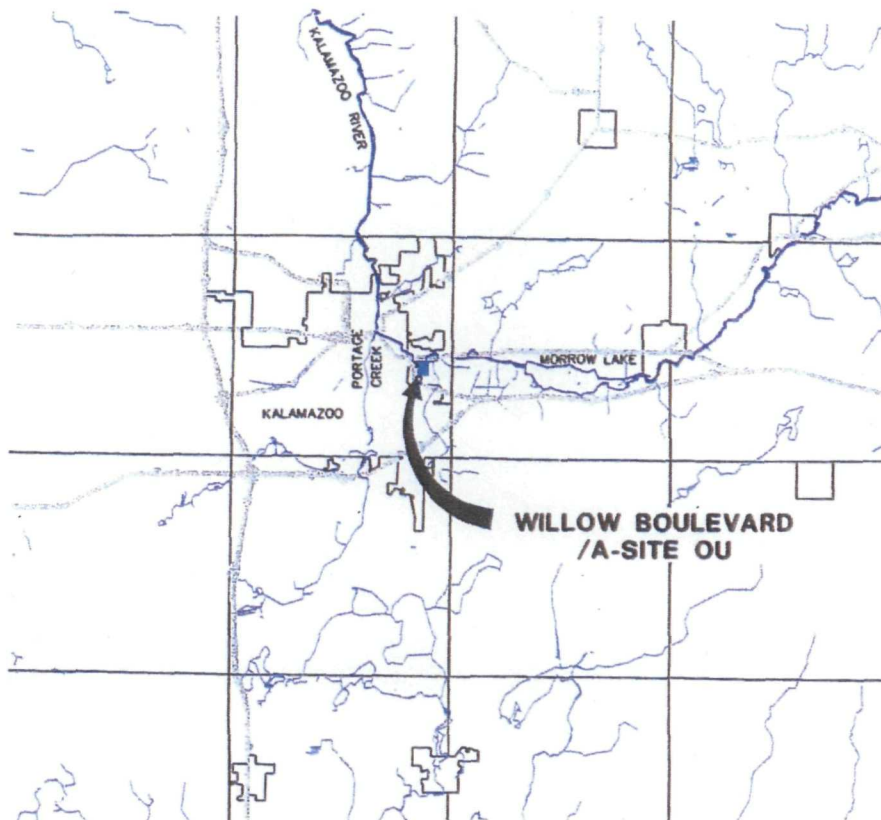
U.S. EPA Response PRP-8: U.S. EPA's Proposed Plan does not specify a contingent groundwater remedy. The description for Alternative 2 on page 5 of U.S. EPA's Proposed Plan states:

“Groundwater monitoring will be conducted and the results will be evaluated. If contaminants are present at concentrations that present a risk to public health or wildlife, then a groundwater cleanup remedy may be required but that remedy will be done under a separate action.”

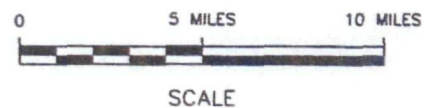
The description of U.S. EPA's preferred cleanup alternative on page 7 of the Proposed Plan also states that long-term groundwater monitoring will be conducted. The description of Sub-alternative 2C in the ROD is consistent with the descriptions in the Proposed Plan, stating that “Long-term maintenance and groundwater monitoring would be conducted” (Sections 9.1.4 and 9.1.2) and that “Long-term groundwater monitoring would verify whether PCBs are mobilizing to groundwater so that an appropriate action could be taken” (Section 10.4).

The Hydrogeologic Groundwater Monitoring Plan will be developed during the remedial design and approved by U.S. EPA in consultation with the MDEQ. U.S. EPA agrees that the components of the long-term groundwater monitoring plan should include the elements described above.

FIGURES



KALAMAZOO COUNTY



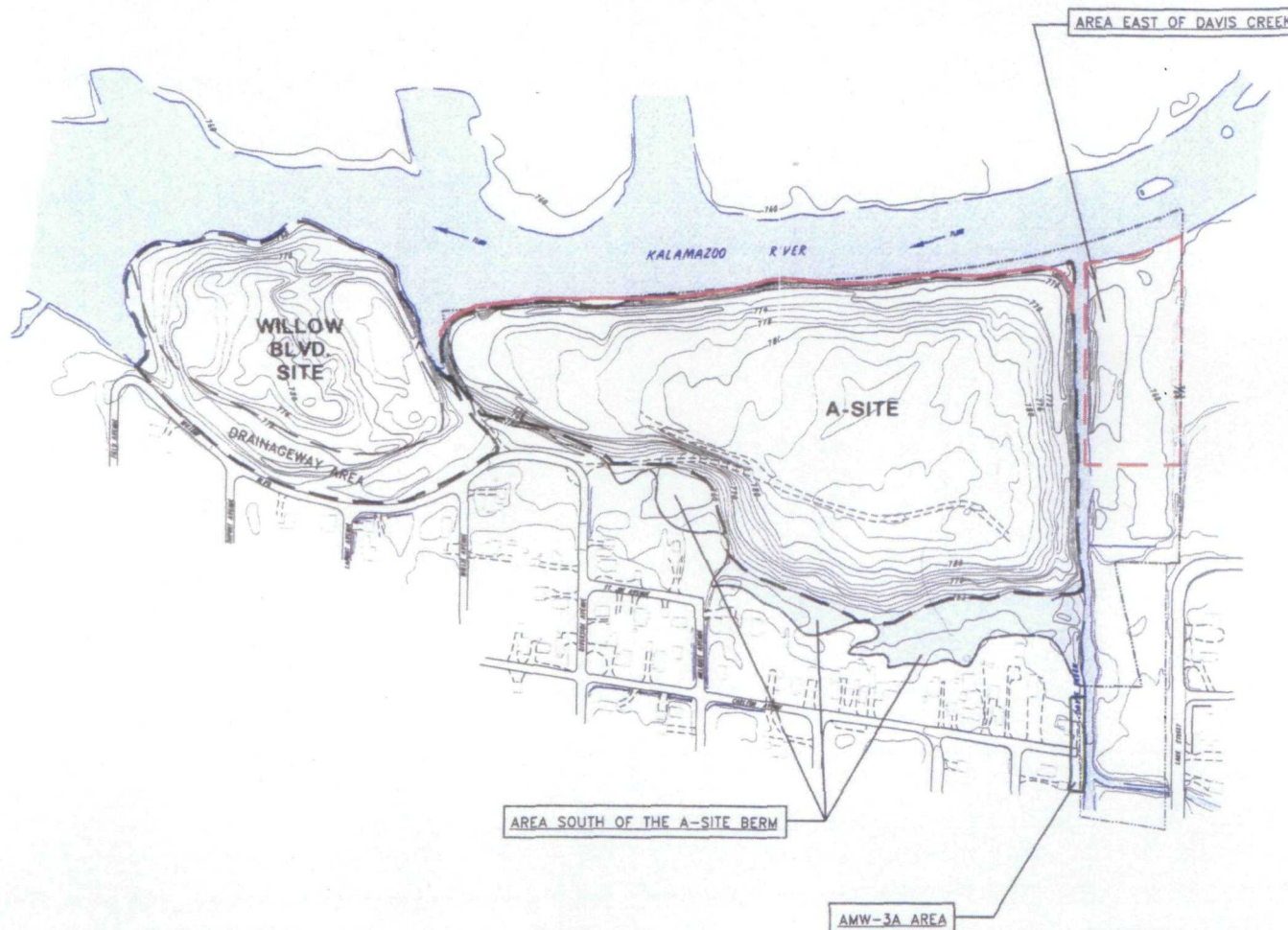
NOTE:

KALAMAZOO COUNTY MAPPING OBTAINED FROM MICHIGAN RESOURCE INFORMATION SYSTEM.

KALAMAZOO RIVER STUDY GROUP
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE
REMEDIAL INVESTIGATION/FOCUSED FEASIBILITY STUDY
WILLOW BOULEVARD /A-SITE OU

Site Location Map

Figure 1



LEGEND

- 789 — ELEVATION CONTOUR (NGVD 1929)
- - - - - EDGE OF WATER OR DRAINAGE CHANNEL
- - - - - UNPAVED ROAD/TRAIL
- - - - - APPROXIMATE A-SITE BOUNDARY
- - - - - GEORGIA-PACIFIC PROPERTY BOUNDARY OUTSIDE OF A-SITE
- FORMER LAUGH AREA
- — — — — EXISTING SHEETPILE WALL

NOTES

1. UNLESS OTHERWISE INDICATED ALL SAMPLE LOCATIONS SURVEYED BY W&E-T&M INC. OCTOBER 1993 THROUGH AUGUST 1996. SAMPLES ARN-1 THROUGH ARN-5 AND WRN-1 THROUGH WRN-5 WERE SURVEYED BY B&L JULY 1993.
2. TOPOGRAPHIC MAPPING PRODUCED USING PHOTOGRAMMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN APRIL 1991. KALAMAZOO RIVER SOUTH BANK, EAST OF DAVIS CREEK REVISED PER CURRENT CONDITIONS. ADDITIONAL TOPOGRAPHIC CHANGES AFTER APRIL 1991 ARE NOT SHOWN.
3. ALL LOCATIONS ARE APPROXIMATE.

150' 0 300'
SCALE

KALAMAZOO RIVER STUDY GROUP
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE
REMEDIAL INVESTIGATION/FOCUSED FEASIBILITY STUDY
WILLOW BOULEVARD/A-SITE DU

OU2 and Adjacent Areas

Figure 2

X: 64581023
L: ON=*, OFF=REF*, WBL*, N=*, DN=WBL-SPL
P: FIG-2-3
2/23/01 SYR-54-RUP QUP GMS
64581640/64581028.DWG

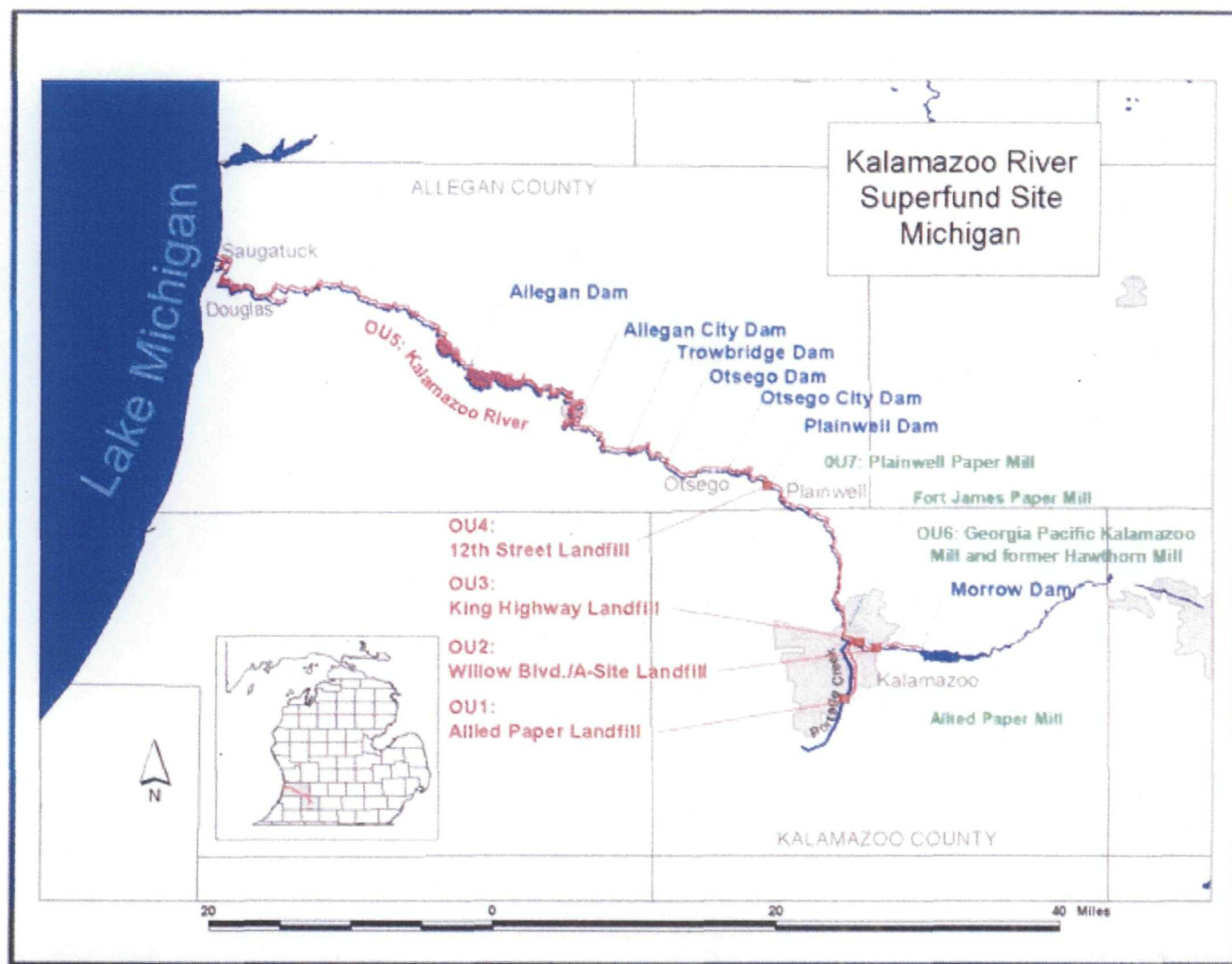


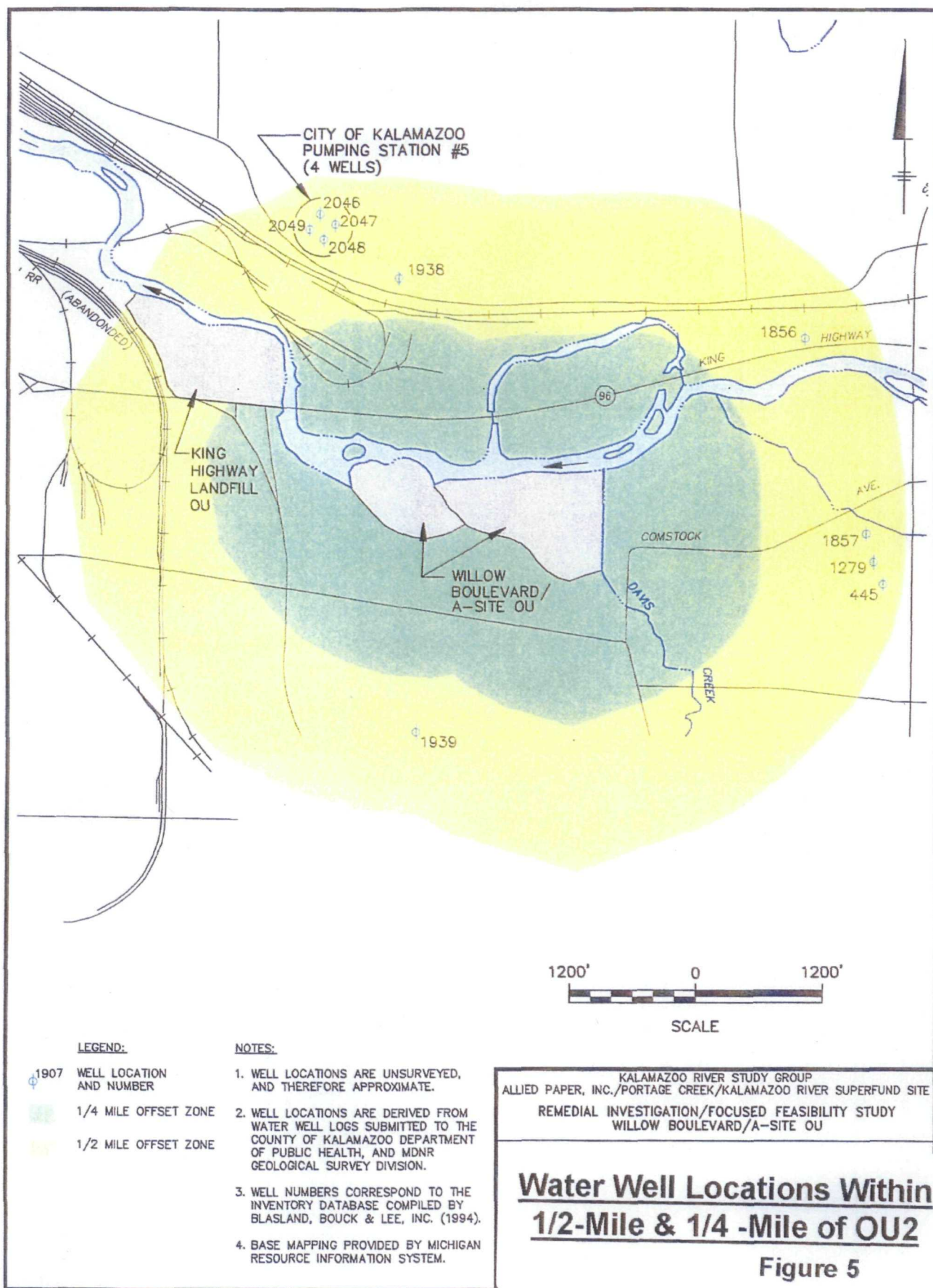
Figure 3 – Map of Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

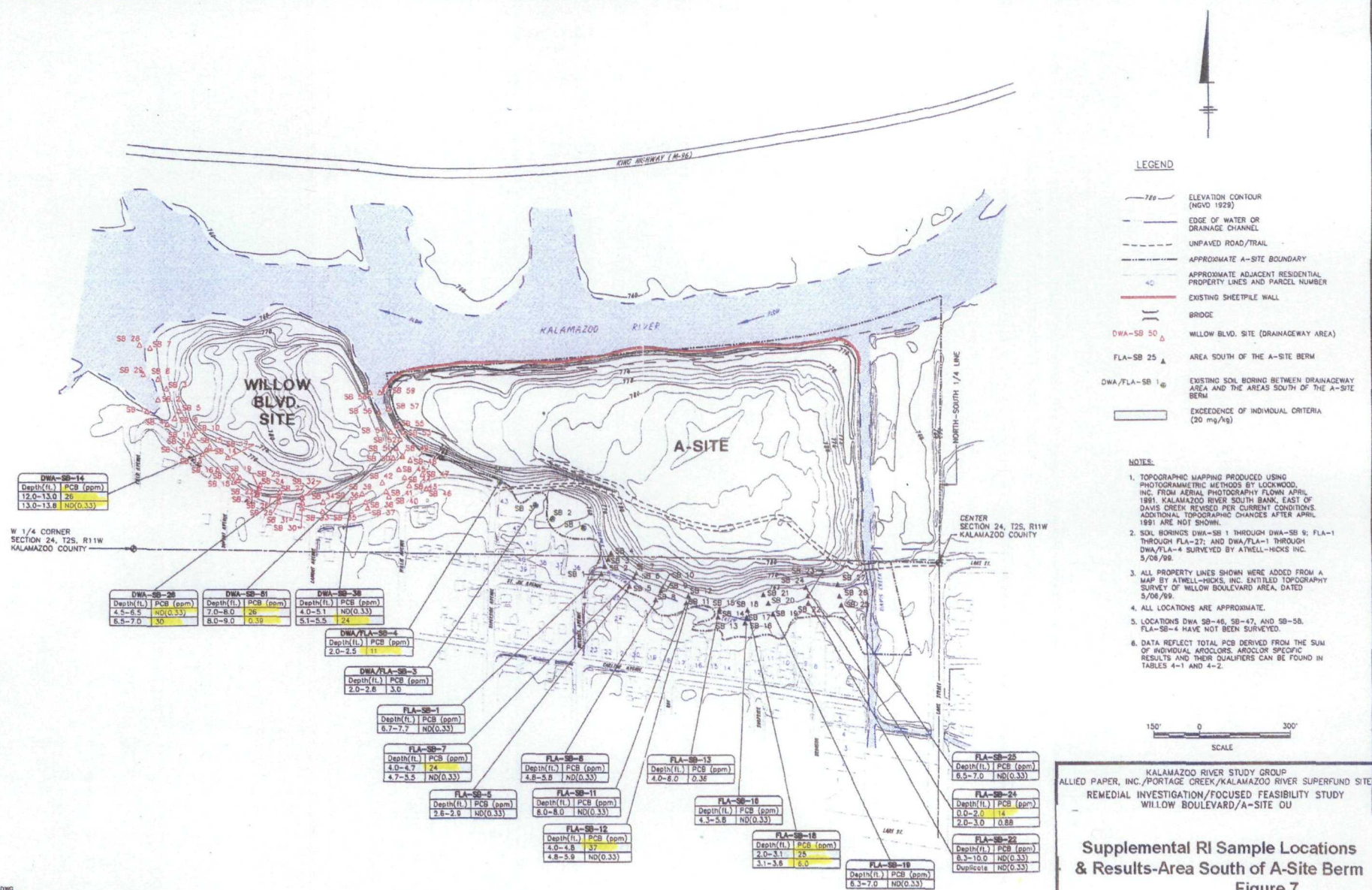


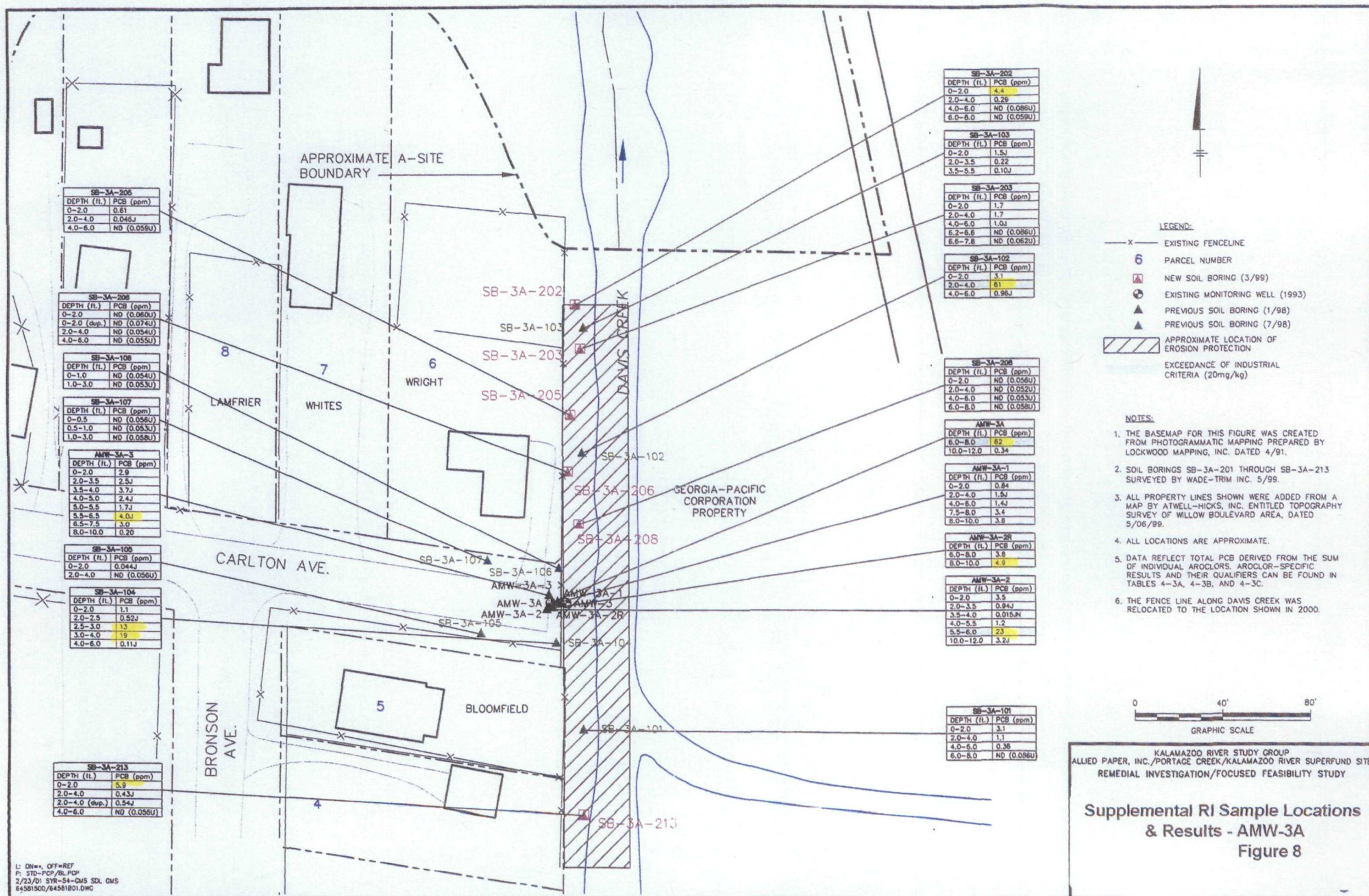
Aerial view of the Willow Boulevard/A-site, looking west (downstream). The bottom $\frac{3}{4}$ of the picture is the A-site. The interim sand cover on the Willow Blvd portion can be seen at the top of the photo. CDM, April, 2001

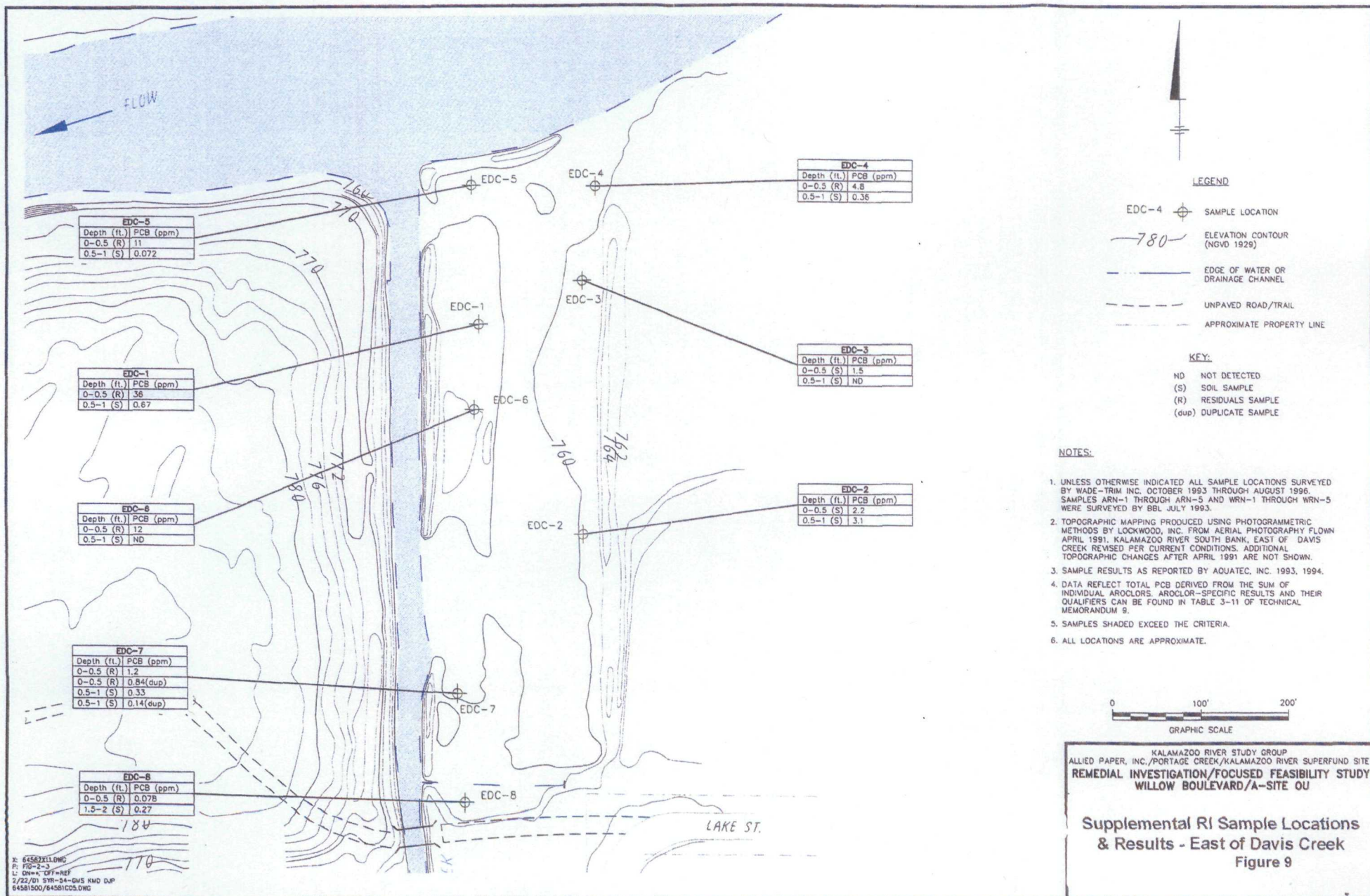
Aerial View of OU2

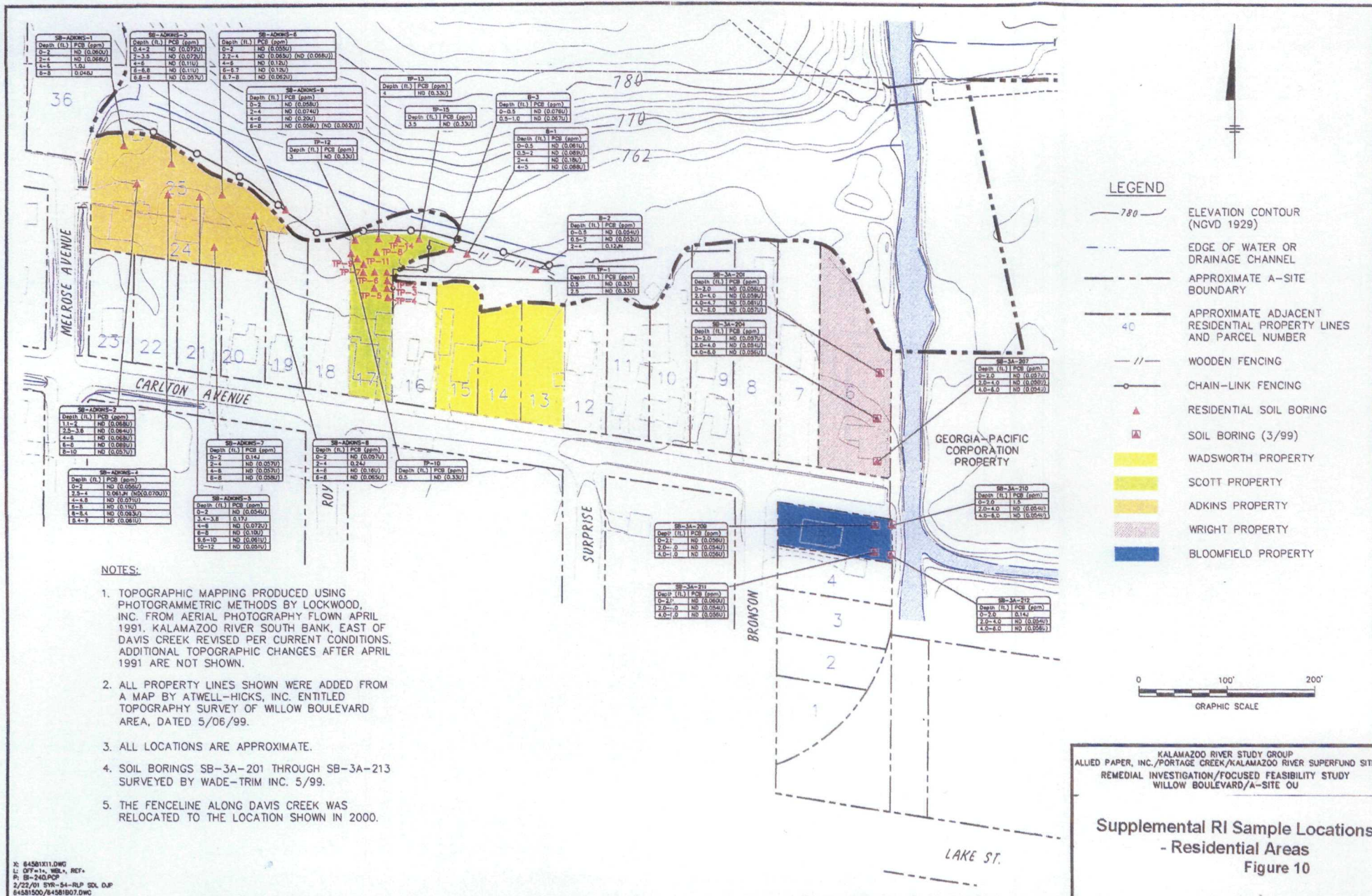
Figure 4











PHOTOGRAPHS



Black geofabric on the north bank of the Willow Blvd. portion of the OU. The fabric has parted, exposing gray paper waste. Residual material is visible in the river. CDM, 2001.

Photograph 1 – Torn Geofabric & Exposed Paper Waste at Willow Boulevard Landfill



Photo 8: Paper residuals exposed at the surface of the A-site portion of the OU. (CDM, 2003).



Photo 9: Residuals exposed at the surface on east side of A-site. (CDM, 2003).

Photograph 2 – Exposed Residuals at A-Site Landfill

ATTACHMENTS

Attachment 1

Attachment 1

Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site

Preliminary Cost Estimate Sub-alternative 2A - Willow Boulevard

Consolidation/Containment of Select Materials,
Install New Sheet Piling at Willow Boulevard,
Retain Existing Sheet Piling at A-Site

	Quantity	Units	Unit Cost (\$)	Item Cost (\$)	Comments
Direct Costs:					
1. Mobilization/Demobilization	1	Lump Sum	2%	\$0	2% Mob/Demob Included in 10% Indirect Costs below.
2. Installation of Additional Groundwater Wells at Willow Boulevard	5	Each	\$5,000	\$25,000	Costs for installation of double-cased wells.
3. Mechanical Excavation	5,000	Cubic Yard	\$2.24	\$11,200	Excavation of drainageway as necessary to construct cover system
4. Sheet Piling					
a. Excavation	2,000	Cubic Yard	\$10.20	\$20,400	Existing Bank adjacent to Kalamazoo River, placing spoils on-site
b. Sheet Pile Installation	1,800	Linear Feet	\$874	\$1,573,200	Installation of sheetpile along Kalamazoo River
c. Backfill	2,000	Cubic Yard	\$12.75	\$25,500	Backfill material between new sheet piling and residuals.
5. Recontour Existing Grade	14,500	Cubic Yard	\$1.52	\$22,040	9 acres, 1 ft. thickness.
6. Part 115 Type III Cap					Based on 7.6 acres.
a. Filter Fabric	12,300	Square Yard	\$1.84	\$22,632	12 oz/sy Geotextile/Drainage Fabric (130 mil).
b. Gas Venting Layer	6,100	Cubic Yard	\$13.96	\$85,156	6-inch thickness. Sand, 6" lifts, on-site.
c. Flexible Membrane Liner	12,300	Square Yard	\$6.03	\$74,169	Fabric Membrane Liner/Bentonite Liner.
d. Drainage Layer	24,500	Cubic Yard	\$13.96	\$342,020	2-ft. thickness. Sand, 6" lifts, on-site.
e. Filter Fabric	12,300	Square Yard	\$2.81	\$34,563	12 oz/sy Geotextile/Drainage Fabric (130 mil).
f. Topsoil Layer	6,100	Cubic Yard	\$7.07	\$43,127	6-inch thickness.
g. Vegetative Cover	7.6	Acre	\$14,572	\$110,747	Restoration and creation of vegetative cover.
h. Gas Vents	8	Each	\$600	\$4,800	One per acre, 8", HDPE Elbow construction.
7. Stormwater Management System					
a. Sedimentation Basin	1	Lump Sum	\$15,000	\$15,000	Approximately 0.5 acres.
b. Pore Water Collection System	2,500	Linear Foot	\$9.60	\$24,000	Around perimeter of landfill, 6" diameter perforated PVC.
c. Cover System Drainage Swales	1,500	Linear Foot	\$9.72	\$14,580	Grass-lined approximately 18" high with permanent erosion control mat.
d. Ditches (grass-lined)	4,000	Linear Foot	\$9.72	\$38,880	Approximately 18" deep by 9" wide and overlain with permanent erosion control mat.
e. Erosion control Mat	50,000	Square Foot	\$0.65	\$32,500	Assumed to be placed along upgradient access road side slopes and along the toe of the capped landfill side slopes.
f. Ditches (rip-rap lined)	800	Linear Foot	\$17.60	\$14,080	Approximately 18-inches deep by 12-feet wide and underlain with non-woven geotextile.
g. Downchutes	300	Linear Foot	\$30.00	\$9,000	Rip-rap filled reno mattress placed within a 12-foot wide channel and underlain with geomembrane.
h. Culverts	400	Linear Feet	\$15.40	\$6,160	
Subtotal, Direct Costs				\$2,548,754	

See Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2A - Willow Boulevard**

**Consolidation/Containment of Select Materials,
Install New Sheet Piling at Willow Boulevard,
Retain Existing Sheet Piling at A-Site**

CONSTRUCTION COSTS					
Item	Quantity	Unit	Unit Price (\$)	Item Cost (\$)	Comments
Indirect Construction Costs:					
1. Add Div 01 (General Conditions) and General Contractor's OH+P% Allow 10%	1	Lump Sum	10%	\$254,875	Adjusted by CDM Estimating Dept.
2. State Sales Tax - Assume project is Tax exempt	1	Lump Sum			Submitted by CDM Estimating Dept.
3. Allow for MBE/WBE/EED Requirements Allow 1/2 of 1% of direct costs.	1	Lump Sum	1/2 of 1%	\$12,744	Adjusted by CDM Estimating Dept.
4. Adjust labor costs due to Health and Safety Levels of Protection	1	Lump Sum	5%	\$50,975	Adjusted by CDM Estimating Dept. Use EPA/COE Reference # 540-R-00-002 dated July 2000. Refer to Appendix B. Use 5% as adjustment Costs = (5%) (\$2,548,754 * 40%)
5. Adjust Project Costs due to Local Area Cost Factors	1	Lump Sum	1.076	\$193,705	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000. Refer to Appendix B. Use Means 2002 Michigan Factor of 1.076.
Subtotal, Indirect Construction Costs =				\$512,299	
Construction Cost Summary:					
	Subtotal, Direct and Indirect Construction Costs =			\$3,061,053	
1. Add Contingency at 30%	1	Lump Sum	30%	\$918,316	
2. Allow Engineering and Design Costs at 15%	1	Lump Sum	15%	\$459,158	
3. Adjust Construction Cost Escalation to MPC	1	Lump Sum	4.5%	\$137,747	Adjusted by CDM Estimating Dept. Allow 1.5 years at 3%/year or 4.5% escalation.
Total, Capital Cost Estimate Remedial Alternative 2A-Willow Site				= \$4,576,274	
			Rounded to:	\$4,580,000	
			Three Year Present Value (7):	\$4,010,000	

See Notes on Page 6

Preliminary Cost Estimate
 Sub-alternative 2A - Willow Boulevard

Consolidation/Containment of Select Materials,
 Install New Sheet Piling at Willow Boulevard,
 Retain Existing Sheet Piling at A-Site

ITEMS TO BE INCLUDED					
1. Cap Maintenance	2	Event	\$10,000	\$20,000	Includes mowing and restoration of the site.
2. Cap Repairs	61	Cubic Yard	\$15	\$915	Replace 1% of topsoil cover.
3. Gas Monitoring	12	Lump Sum	\$1,504	\$18,048	One person, one 10-hour day/month
4. Groundwater Monitoring	4	Lump Sum	\$18,599	\$74,396	Quarterly Sampling of groundwater monitoring system. 4 events/year, one 2-person crew, 40 crew hours/event, 10 samples for complete TC analysis
			Subtotal:	\$113,359	
			15% Engineering(5):	\$17,004	
			30% Contingency(6):	\$34,008	
			Total:	\$164,371	
			30-Year Present Worth Cost (7):	\$2,039,674	
30-Year Present Worth Cost: \$2,039,674					

See Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2A - A-Site**

**Consolidation/Containment of Select Materials,
Install New Sheet Piling at Willow Boulevard,
Retain Existing Sheet Piling at A-Site**

Direct Costs:					
1. Mobilization/Demobilization	1	Lump Sum	2%	\$0	2% Mob/Demob Included in 10% Indirect Costs below
2. Site Preparation	17	Acre	\$6,925	\$117,725	Cost for clearing/chip trees (<12" diameter) and grubbing stumps
3. Installation of Additional Groundwater Wells at A-Site	7	Each	\$5,000	\$35,000	Costs for installation of double-cased wells.
4. Mechanical Excavation	6,700	Cubic Yard	\$10.20	\$68,340	Includes excavating residuals east of Davis Creek & south of A-site Berm as necessary to construct cover system and relocating to stabilization area.
5. Confirmatory Sampling/Analysis	1	Lump Sum	\$10,000	\$10,000	In areas excavated as part of Item 4
6. Bank Stabilization					
a. Bank Regrading	5,000	Cubic Yard	\$5.85	\$29,250	Includes cost for regrading Bank to 4H:1V.
b. Erosion Control	1,700	Cubic Yard	\$70.00	\$119,000	Includes cost for rip-rap (6- to 8-inch stone), geotextile, and vegetation.
6. Recontour Existing Grade	16,800	Cubic Yard	\$4.11	\$69,048	20 Acres, varied thickness.
7. Part 115 Type III Cap					Based on 19.6 acres.
a. Filter Fabric	31,600	Square Yard	\$1.84	\$58,144	12 oz/sy Geotextile/Drainage Fabric (130 mil).
b. Gas Venting Layer	15,800	Cubic Yard	\$13.96	\$220,568	6-inch thickness. Sand, 6" lifts, on-site.
c. Flexible Membrane Liner	31,600	Square Yard	\$6.03	\$190,548	Fabric Membrane Liner/Bentonite Liner
d. Drainage Layer	63,000	Cubic Yard	\$13.96	\$879,480	2-ft. thickness. Sand, 6" lifts, on-site.
e. Filter Fabric	31,600	Square Yard	\$2.81	\$88,796	12 oz/sy Geotextile/Drainage Fabric (130 mil).
f. Topsoil Layer	15,800	Cubic Yard	\$7.07	\$111,706	6-inch thickness.
g. Vegetative Cover	19.6	Acre	\$14,572	\$285,611	Restoration and creation of vegetative cover.
h. Gas Vents	20	Each	\$600	\$12,000	One per acre, 8", HDPE Elbow construction.
8. Stormwater Management System					
a. Sedimentation Basin	1	Lump Sum	\$30,000	\$30,000	Approximately 2 acres.
b. Pore Water Collection System	4,000	Linear Foot	\$9.60	\$38,400	Around perimeter of landfill, 6" diameter perforated PVC.
c. Cover System Drainage Swales	4,500	Linear Foot	\$9.72	\$43,740	Grass-lined approximately 18" high with permanent erosion control mat.
d. Ditches (grass-lined)	10,000	Linear Foot	\$9.72	\$97,200	Approximately 18-inches deep by 9-feet wide and overlain with permanent erosion control mat.
e. Erosion control Mat	80,000	Square Foot	\$0.20	\$16,000	Assumed to be placed along upgradient access road side slopes and along the toe of the capped landfill side slopes.
f. Ditches (rip-rap lined)	800	Linear Foot	\$17.60	\$14,080	Approximately 18-inches deep by 12-feet wide and underlain with non-woven geotextile.
g. Downchutes	600	Linear Foot	\$30.00	\$18,000	Rip-rap filled Reno mattress placed within a 12-foot wide channel and underlain with geomembrane.
h. Culverts	400	Linear Feet	\$15.00	\$6,000	
9. Erosion Control at AMW-3A Area	1	Lump Sum	\$5,000	\$5,000	Installation of erosion control measures.
10. Restoration of Area East of Davis Creek					
a. Backfilling	3,800	Cubic Yard	\$7.62	\$28,956	Backfilling excavated area to pre-removal grade.
b. Vegetative Cover	7	Acre	\$14,572	\$102,004	Restoration and creation of vegetative cover of excavated area
Subtotal, Direct Costs:				\$2,694,596	

See Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2A - A-Site**

**Consolidation/Containment of Select Materials,
Install New Sheet Piling at Willow Boulevard,
Retain Existing Sheet Piling at A-Site**

					Comments
Indirect Construction Costs:					
1. Add Div 01 (General Conditions) and General Contractor's OH+P% Allow 10%	1	Lump Sum	10%	\$269,460	Adjusted by CDM Estimating Dept.
2. State Sales Tax-Assume project is tax exempt	1	Lump Sum			Submitted by CDM Estimating Dept.
3. Allow for MBE/WBE/EEO Requirements Allow 1/2 of 1% of Direct Costs	1	Lump Sum	1/2 of 1%	\$13,473	Adjusted by CDM Estimating Dept.
4. Adjust Labor Costs due to Health and Safety Levels of Protection	1	Lump Sum	5%	\$53,892	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000. Refer to Appendix B. Use 5% as adjustment. Costs = (5%) (\$2,694,596 * 40%)
5. Adjust Project Costs due to Local Area Cost Factors	1	Lump Sum	1.076	\$204,789	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000. Refer to Appendix B. Use Means 2002 Michigan Factor of 1.076
Subtotal, Indirect Construction Costs =				\$541,614	
Construction Cost Summary:					
		Subtotal, Direct and Indirect Construction Costs =		\$3,236,210	
1. Add Contingency at 30%	1	Lump Sum	30%	\$970,863	
2. Allow Engineering and Design Costs at 15%	1	Lump Sum	15%	\$485,432	
3. Adjust Construction Cost Escalation to MPC	1	Lump Sum	4.5%	\$145,629	Adjusted by CDM Estimating Dept. Allow 1.5 years @ 3%/year of 4.5% Escalation
Total, Capital Cost Estimate Remedial Alternative 2A- A-Site					
				=	\$4,838,134
				Rounded to	\$4,850,000
				Three Year Present Value (7):	\$4,240,000

See Notes on Page 6

Preliminary Cost Estimate
Sub-alternative 2A - A-Site

Consolidation/Containment of Select Materials,
Install New Sheet Piling at Willow Boulevard,
Retain Existing Sheet Piling at A-Site

ANNUAL POST-REMEDIATION SITE CONTROL						
	Quantity	Units	Unit Cost (\$)	Item Cost (\$)		Comments
1. Cap Maintenance	2	Event	\$24,000	\$48,000		Includes mowing and restoration of the site.
2. Cap Repairs	158	Cubic Yard	\$15	\$2,370		Replace 1% of topsoil cover.
3. Gas Monitoring	12	Lump Sum	\$1,504	\$18,048		One person, one 10-hour day/month
4. Groundwater Monitoring	4	Lump Sum	\$23,299	\$93,196		Quarterly Sampling of groundwater monitoring system. 4 events/year, one 2-person crew, 40 crew hours/event, 15 samples for complete TC analysis
			Subtotal:	\$161,614		
			15% Engineering(5):	\$24,242		
			30% Contingency(6):	\$48,484		
			Total:	\$234,340		
			30-Year Present Worth Cost (7):	\$2,907,929		
			Rounded Total:	\$2,910,000		
			A-Site Total Project Present Worth Cost:	\$7,150,000		

WILLOW BOULEVARD SITE TOTAL PROJECT PRESENT WORTH COST:		\$6,050,000
A-SITE TOTAL PROJECT PRESENT WORTH COST:		\$7,160,000
SUB-ALTERNATIVE 2A TOTAL PROJECT PRESENT WORTH COST:		\$13,210,000

Notes:

1. Unit cost shown includes material and labor costs unless otherwise noted.
 2. Costs estimated based on similar project experience and R.S. Means Company 2001a; 2001b.
 4. Cap repairs and maintenance will be implemented as necessary every year for a period of 30 years.
 5. A 15% contingency is included to account for engineering fees. Contingency does not include legal fees and permit acquisition. Engineering Contingency developed based upon USEPA, 1987.
 6. A 30% contingency is included provide for unexpected circumstances or variability in estimate areas, volumes, labor and material costs. Contingency allowance developed based upon USEPA, 1987.
 7. 30-year present worth based on a 7.0 percent discount rate as published in USEPA, 1993c, and has been applied to Annual/O&M Costs
- Project fixed costs will be spread out over 3 years, with present worth based on a 7% discount rate as published in USEPA, 1993c, and has been applied to all other costs.

**Preliminary Cost Estimate
Sub-alternative 2B - Willow Boulevard**

**Consolidation/Containment of Select Materials, Remove Existing Sheet Piling
at A-Site, Re-Grade/Stabilize Banks with a Setback at Willow Boulevard**

Direct Costs:					
1. Mobilization/Demobilization	1	Lump Sum	2%	\$0	2% Mob/Demob Included in 10% Indirect Costs below.
2. Installation of Additional Groundwater Wells at Willow Boulevard	5	Each	\$5,000.00	\$25,000	Costs for installation of double-cased wells.
3. Mechanical Excavation	5,000	Cubic Yard	\$2.24	\$11,200	Costs for excavation of drainageway as necessary to construct cover system.
4. Bank Stabilization					
a. Bank Regrading	3,000	Cubic Yard	\$5.85	\$17,550	Includes regrading of Bank to 4H:1V slope.
b. Earthen Berm	3,600	Cubic Yard	\$12.75	\$45,900	New engineered fill berm
c. Erosion Control	1,800	Linear Feet	\$70.00	\$126,000	Includes rip-rap (6- to 8-inch stone), geotextile, and erosion control block.
d. Water Treatment	1,000,000	gallons	\$0.10	\$100,000	Costs for treating (sand filtration/carbon adsorption) water infiltrating excavation (3 feet deep by 50 feet long) in the event that residual materials are found during the setback process, assumes 50,000 gpd, for 20 days.
5. Recontour Existing Grade	93,236	Cubic Yard	\$4.11	\$383,200	To accommodate 5H:1V Slope
6. Part 115 Type III Cap					Based on 7.6 acres.
a. Filter Fabric	12,300	Square Yard	\$1.84	\$22,632	12 oz/sy Geotextile/Drainage Fabric (130 mil).
b. Gas Venting Layer	6,100	Cubic Yard	\$13.96	\$85,156	6-inch thickness. Sand, 6" lifts, on-site.
c. Flexible Membrane Liner	12,300	Square Yard	\$6.03	\$74,169	Fabric Membrane Liner/Bentonite Liner.
d. Drainage Layer	24,500	Cubic Yard	\$13.96	\$342,020	2-ft. thickness. Sand, 6" lifts, on-site.
e. Filter Fabric	12,300	Square Yard	\$2.81	\$34,563	12 oz/sy Geotextile/Drainage Fabric (130 mil).
f. Topsoil Layer	6,100	Cubic Yard	\$7.07	\$43,127	6-inch thickness.
g. Vegetative Cover	7.6	Acre	\$14,572.00	\$110,747	Restoration and creation of vegetative cover.
h. Gas Vents	8	Each	\$600.00	\$4,800	One per acre, 8", HDPE Elbow construction.
7. Stormwater Management System					
a. Sedimentation Basin	1	Lump Sum	\$15,000.00	\$15,000	Approximately 0.5 acres.
b. Pore Water Collection System	2,500	Linear Foot	\$9.60	\$24,000	Around perimeter of landfill, 6" diameter perforated PVC
c. Cover System Drainage Swales	1,500	Linear Foot	\$9.72	\$14,580	Grass-lined approximately 18" high with permanent erosion control mat
d. Ditches (grass-lined)	4,000	Linear Foot	\$9.72	\$38,880	Approximately 18-inches deep by 9-feet wide and overlain with permanent erosion control mat.
e. Erosion control M:	50,000	Square Foot	\$0.65	\$32,500	Assumed to be placed along upgradient access road side slopes and along the toe of the capped landfill side slopes.
f. Ditches (rip-rap lined)	800	Linear Foot	\$17.60	\$14,080	Approximately 18-inches deep by 12-feet wide and underlain with non-woven geotextile.
g. Downchutes	300	Linear Foot	\$30.00	\$9,000	Rip-rap filled reno mattress placed within a 12-foot wide channel and underlain with geomembrane.
h. Culverts	400	Linear Feet	\$15.40	\$6,160	
Subtotal, Direct Costs:				\$1,580,264	

**Preliminary Cost Estimate
Sub-alternative 2B - Willow Boulevard**

**Consolidation/Containment of Select Materials, Remove Existing Sheet Piling
at A-Site, Re-Grade/Stabilize Banks with a Setback at Willow Boulevard**

Indirect Construction Costs					
1. Add Div 01 (General Conditions) and (General Contractor's OH+P% Allow 10%	1	Lump Sum	10%	\$158,026	Adjusted by CDM Estimating Dept.
2. State Sales Tax -Assume project is tax exempt	1	Lump Sum			Submitted by CDM Estimating Dept.
3. Allow for MBE/WBE EEO Requirements Allow 1/2 of 1% of Direct Costs	1	Lump Sum	1/2 of 1%	\$7,901	Adjusted by CDM Estimating Dept.
4. Adjust Labor Costs due to Health and Safety Levels of Protection	1	Lump Sum	5%	\$31,605	Adjusted by CDM Estimating Dept. Use EPA/COE Reference # 540-R-00-002 dated July 2000. Refer to Appendix B. Use 5% as adjustment. Costs = (5%) (\$1,580,264 *40%)
5. Adjust Project Costs due to Local Area Cost Factors	1	Lump Sum	1.076	\$120,100	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000 Refer to Appendix B. Use Means 2002 Michigan Factor of 1.076
Subtotal, Indirect Construction Costs =				\$317,632	
Construction Cost Summary:					
Subtotal, Direct and Indirect Construction Costs =				\$1,897,896	
1. Add Contingency at 30%	1	Lump Sum	30%	\$569,369	
2. Allow Engineering and Design Costs at 15%	1	Lump Sum	15%	\$284,684	
3. Adjust Construction Cost Escalation to MDC	1	Lump Sum	4.5%	\$85,405	Adjusted by CDM Estimating Dept. Allow 1.5 years @ 3% or 4.5% Escalation.
Total, Capital Cost Estimate				= \$2,837,355	
Remedial Alternative				Rounded to \$2,840,000	
2B-Willow Site				Three Year Present Value (7): \$2,490,000	

See Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2B - Willow Boulevard**

**Consolidation/Containment of Select Materials, Remove Existing Sheet Piling
at A-Site, Re-Grade/Stabilize Banks with a Setback at Willow Boulevard**

1.	Cap Maintenance	2	Event	\$10,000	\$20,000	Includes mowing and restoration of the site.
2.	Cap Repairs	61	Cubic Yard	\$15	\$915	Replace 1% of topsoil cover.
3.	Gas Monitoring	12	Lump Sum	\$1,504	\$18,048	One person, one 10-hour day/month
4.	Groundwater Monitoring	4	Lump Sum	\$18,599	\$74,396	Quarterly Sampling of groundwater monitoring system. 4 events/year, one 2-person crew, 40 crew hours/event, 10 samples for complete TC analysis
				Subtotal:	\$113,359	
				15% Engineering(5):	\$17,004	
				30% Contingency(6):	\$34,008	
				Total:	\$164,371	
				30-Year Present Worth Cost (7):	\$2,039,674	
				Willow Boulevard Site Total Project Present Worth Cost	\$4,590,000	

See Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2B - A-Site**

**Consolidation/Containment of Select Materials, Remove Existing Sheet Piling
at A-Site, Re-Grade/Stabilize Banks with a Setback at Willow Boulevard**

Item	Quantity	Unit	Unit Cost (\$)	Total Cost (\$)	Comments
Direct Costs:					
1. Mobilization/Demobilization	1	Lump Sum	2%	\$0	2% Mob/Demob Included in 10% Indirect Costs Below
2. Site Preparation	17	Acre	\$6,925	\$117,725	Cost for clearing/chip trees (<12" diameter) and grubbing stumps.
3. Installation of Additional Groundwater Wells at A-Site	7	Each	\$5,000	\$35,000	Costs for installation of double-cased wells.
4. Mechanical Excavation	6,700	Cubic Yard	\$15	\$100,500	Includes excavating residuals east of Davis Creek and south of A-site Barn as necessary to construct cover system and relocating to stabilization area.
5. Confirmatory Sampling/Analysis	1	Lump Sum	\$10,000	\$10,000	In areas excavated as part of Item 4
5. Remove Sheeting Sheet Pile Removal	1,700	Linear Feet	\$43.30	\$73,610	Cost to cut steel sheeting at water level and disposing of 646 tons of steel Pulling all of existing sections out of the ground and disposing, \$800/l.f.
6. Recontour Existing Grade	180,427	Cubic Yard	\$4.11	\$741,555	To accommodate 5H:1V Slope
7. Part 115 Type III Cap					Based on 19.6 acres.
a. Filter Fabric	31,600	Square Yard	\$1.84	\$58,144	12 oz/sy Geotextile/Drainage Fabric (130 mil).
b. Gas Venting Layer	15,800	Cubic Yard	\$13.96	\$220,568	6-inch thickness. Sand, 6" lifts, on-site.
c. Flexible Membrane Liner	31,600	Square Yard	\$6.03	\$190,548	Fabric Membrane Liner/Bentonite Liner.
d. Drainage Layer	63,000	Cubic Yard	\$13.96	\$879,480	2-ft. thickness. Sand, 6" lifts, on-site.
e. Filter Fabric	31,600	Square Yard	\$2.81	\$88,796	12 oz/sy Geotextile/Drainage Fabric (130 mil).
f. Topsoil Layer	15,800	Cubic Yard	\$7.07	\$111,706	6-inch thickness.
g. Vegetative Cover	19.6	Acre	\$14,572.00	\$285,611	Restoration and creation of vegetative cover.
h. Gas Vents	20	Each	\$600.00	\$12,000	One per acre, 8", HDPE Elbow construction.
8. Stormwater Management System					
a. Sedimentation Basin	1	Lump Sum	\$30,000.00	\$30,000	Approximately 2 acres.
b. Pore Water Collection System	4,000	Linear Foot	\$9.60	\$38,400	Around perimeter of landfill, 6" diameter perforated PVC.
c. Cover System Drainage Swales	4,500	Linear Foot	\$9.72	\$43,740	Grass-lined approximately 18" high with permanent erosion control mat.
d. Ditches (grass-lined)	10,000	Linear Foot	\$9.72	\$97,200	Approximately 18-inches deep by 9-feet wide and overlain with permanent erosion control mat.
e. Erosion control Mat	80,000	Square Foot	\$0.20	\$16,000	Assumed to be placed along upgradient access road side slopes and along the toe of the capped landfill side slopes.
f. Ditches (rip-rap lined)	800	Linear Foot	\$17.60	\$14,080	Approximately 18-inches deep by 12-feet wide and underlain with non-woven geotextile.
g. Downchutes	600	Linear Foot	\$30.00	\$18,000	Rip-rap filled reno mattress placed within a 12-foot wide channel and underlain with geomembrane.
h. Culverts	400	Linear Feet	\$15.00	\$6,000	
9. Erosion Control at AMW-3A Area	1	Lump Sum	\$5,000.00	\$5,000	Installation of erosion control measures.
10. Restoration of Area East of Davis Creek					
a. Backfilling	3,800	Cubic Yard	\$7.62	\$28,956	Backfilling excavated area to pre-removal grade.
b. Vegetative Cover	7	Acre	\$14,572.00	\$102,004	Restoration and creation of vegetative cover of excavated area.
Subtotal Direct Costs				\$3,324,623	

See Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2B - A-Site**

**Consolidation/Containment of Select Materials, Remove Existing Sheet Piling
at A-Site, Re-Grade/Stabilize Banks with a Setback at Willow Boulevard**

Item Description	Quantity	Unit	Unit Cost (\$)	Item Cost (\$)	Comments
Indirect Construction Costs:					
1. Add Div 01 (General Conditions) and General Contractor's OH+P% Allow 10%	1	Lump Sum	10%	\$332,462	Adjusted by CDM Estimating Dept.
2. State Sales Tax- Assume project is tax exempt.	1	Lump Sum			Submitted by CDM Estimating Dept.
3. Allow for MBE/WBE/EEO Requirements Allow 1/2 of 1% of Direct Costs.	1	Lump Sum	1/2 of 1%	\$16,623	Adjusted by CDM Estimating Dept.
4. Adjust Labor Costs due to Health and Safety Levels of Protection	1	Lump Sum	5%	\$66,492	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000. Refer to Appendix B. Use 5% as Adjustment. Costs = (5%) (\$3,324,624 * 40%)
5. Adjust Project Cost due to Local Area Cost Factors	1	Lump Sum	1.076	\$252,671	Adjusted by CDM Estimating Dept. Use EPA/COE Reference # 540-R-00-002 dated July 2000. Refer to Appendix B. Use Means 2002 Michigan Factor of 1.076
Subtotal, Indirect Construction Costs =				\$668,248	
Construction Cost Summary:					
Subtotal, Direct and Indirect Construction Costs =				\$3,992,872	
1. Add Contingency At 30%	1	Lump Sum	30%	\$1,197,862	
2. Allow Engineering and Design Cost at 15%	1	Lump Sum	15%	\$598,931	
3. Adjust Construction Cost Escalation To MDC	1	Lump Sum	4.5%	\$179,679	Adjusted by CDM Estimating Dept. Allow 1.5 years at 3%/year or 4.5 Escalation
Total, Capital Cost Estimate Remedial Alternative 2B - A-Site				\$5,969,344	
Rounded to				\$5,970,000	
Three Year Present Value (7):				\$5,220,000	

See Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2B - A-Site**

**Consolidation/Containment of Select Materials, Remove Existing Sheet Piling
at A-Site, Re-Grade/Stabilize Banks with a Setback at Willow Boulevard**

ANNUAL (POST-REMEDIAL SITE CONTROL)					
	Item	Quantity	Units	Unit Cost (\$)	Item Cost (\$)
1.	Cap Maintenance	2	Event	\$24,000	\$48,000
2.	Cap Repairs	158	Cubic Yard	\$15	\$2,370
3.	Gas Monitoring	12	Lump Sum	\$1,504	\$18,048
4.	Groundwater Monitoring	4	Lump Sum	\$23,299	\$93,196
Subtotal:					\$161,614
15% Engineering(5):					\$24,242
30% Contingency(6):					\$48,484
Total:					\$234,340
30-Year Present Worth Cost (7):					\$2,907,929
Rounded Total:					\$2,910,000
A-Site Total Project Present Worth Cost: \$8,130,000					

TOTAL COST	
WILLOW BOULEVARD SITE TOTAL PROJECT PRESENT WORTH COST:	\$4,530,000
A-SITE TOTAL PROJECT PRESENT WORTH COST:	\$8,130,000
SUB - ALTERNATIVE 2B TOTAL PROJECT PRESENT WORTH COST:	\$12,660,000

TOTAL COST	

Notes:

- Unit cost shown includes material and labor costs unless otherwise noted.
- Costs estimated based on similar project experience and R.S. Means Company 2001a; 2001b.
- Cap repairs and maintenance will be implemented as necessary every year for a period of 30 years.
- A 15% contingency is included to account for engineering fees. Contingency does not include legal fees and permit acquisition. Engineering Contingency developed based upon USEPA, 1987.
- A 30% contingency is included provide for unexpected circumstances or variability in estimate areas, volumes, labor and material costs. Contingency allowance developed based upon USEPA, 1987.
- 30-year present worth based on a 7.0 percent discount rate as published in USEPA, 1993c, and has been applied to Annual/O&M Costs
- Project fixed costs will be spread out over 3 years, with present worth based on a 7% discount rate as published in USEPA, 1993c, and has been applied to all other costs
- Refer to Table 7-1 for cost development

**Preliminary Cost Estimate
Sub-alternative 2C - Willow Boulevard**

**Consolidation/Containment of Select Materials,
Re-Grade/Stabilize Banks using Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site**

Item	Quantity	Unit	Unit Price (\$)	Item Cost (\$)	Comments
Direct Costs:					
1. Mobilization/Demobilization	1	Lump Sum	2%	\$0	2% Mob/Demob Included in 10% Indirect Costs below.
2. Installation of Additional Groundwater Wells at Willow Boulevard	5	Each	\$5,000	\$25,000	Costs for installation of double-cased wells.
3. Mechanical Excavation	5,000	Cubic Yard	\$2.24	\$11,200	Costs for excavation of drainageway as necessary to construct cover system. Doubled standard excavation cost.
4. Alternative Methods for Bank Stabilization					
a. Bank Regrading Loam/Topsoil	3,000	Cubic Yard	\$5.85	\$17,550	Includes regrading of Bank to 4H:1V slope. Loam/Topsoil.
b. Erosion Control	12,000	Square Yard	\$5.65	\$67,800	Nylon, 3 dimensional geomatrix, 9 mil thick.
c. Eco-friendly planting	324,000	Square Feet	\$0.50	\$162,000	
d. Water Treatment	1,000,000	gallons	\$0.10	\$100,000	Cost for treating (sand filtration/carbon adsorption) water infiltrating excavation (3 feet deep by 50 feet long) in the event that residual materials are found during the Setback process, assumes 50,000 gpd, for 20 days.
5. Recontour Existing Grade	93,236	Cubic Yard	\$4.11	\$383,200	Re-Balance Site with 4 horizontal to 1 vertical slope
6. Part 115 Type III Cap					Based on 7.6 acres.
a. Filter Fabric	12,300	Square Yard	\$1.84	\$22,632	12 oz/sy Geotextile/Drainage Fabric (130 mil).
b. Gas Venting Layer	6,100	Cubic Yard	\$13.96	\$85,156	6-inch thickness. Sand, 6" lifts, on-site.
c. Flexible Membrane Liner	12,300	Square Yard	\$6.03	\$74,169	Fabric Membrane Liner/Bentonite Liner.
d. Drainage Layer	24,500	Cubic Yard	\$13.96	\$342,020	2-ft. thickness. Sand, 6" lifts, on-site.
e. Filter Fabric	12,300	Square Yard	\$2.81	\$34,563	12 oz/sy Geotextile/Drainage Fabric (130 mil).
f. Topsoil Layer	6,100	Cubic Yard	\$7.07	\$43,127	6-inch thickness.
g. Vegetative Cover	7.6	Acre	\$14,572.00	\$110,747	Restoration and creation of vegetative cover.
h. Gas Vents	8	Each	\$600.00	\$4,800	One per acre, 8", HDPE Elbow construction.
7. Stormwater Management System					
a. Sedimentation Basin	1	Lump Sum	\$15,000.00	\$15,000	Approximately 0.5 acres.
b. Pore Water Collection System	2,500	Linear Foot	\$9.60	\$24,000	Around perimeter of landfill, 6" diameter perforated PVC
c. Cover System Drainage Swales	1,500	Linear Foot	\$9.72	\$14,580	Grass lined approximately 18" high with permanent erosion control mat
d. Ditches (grass-lined)	4,000	Linear Foot	\$9.72	\$38,880	Approximately 18-inches deep by 9-feet wide and overlain with permanent erosion control mat.
e. Erosion control Mat	50,000	Square Foot	\$0.65	\$32,500	Assumed to be placed along upgradient access road side slopes and along the toe of the capped landfill side slopes.
f. Ditches (rip-rap lined)	800	Linear Foot	\$17.60	\$14,080	Approximately 18-inches deep by 12-feet wide and underlain with non-woven geotextile.
g. Downchutes	300	Linear Foot	\$30.00	\$9,000	Rip-rap filled reno mattress placed within a 12-foot wide channel and underlain with geomembrane.
h. Culverts	400	Linear Feet	\$15.40	\$6,160	
Subtotal, Direct Costs:				\$1,638,164	

See Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2C - Willow Boulevard**

**Consolidation/Containment of Select Materials,
Re-Grade/Stabilize Banks using Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site**

CAPITAL DIRECT & INDIRECT					
Item	Quantity	Unit	Unit Cost (\$/ft)	Item Cost (\$)	Comments
Indirect Construction Costs:					
1. Add Div 01 (General Conditions) and General Contractor's OH+P % Allow 10%	1	Lump Sum	10%	\$147,616	Adjusted by CDM Estimating Dept.
2. State Sales Tax- Assume project is tax exempt	1	Lump Sum			Submitted by CDM Estimating Dept.
3. Allow for MBE/WBE/EEO Requirements Allow 1/2 of 1% of Direct Costs.	1	Lump Sum	1/2 of 1%	\$7,380	Adjusted by CDM Estimating Dept.
4. Adjust Labor Costs due to Health and Safety Levels of Protection	1	Lump Sum	5%	\$29,523	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000. Refer to Appendix B. Use 5% as adjustment. Costs = (5%) (\$1,476,164 *40%)
5. Adjust Project Costs due to Local Area Cost Factors	1	Lump Sum	1.076	\$112,188	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000. Refer to Appendix B. Use Means 2002 Michigan Factor of 1%
Subtotal, Indirect Construction Costs=				\$296,707	
Construction Cost Summary:					
Subtotal Direct, and Indirect Construction Costs =				\$1,77,871	
1. Add Contingency at 30%	1	Lump Sum	30%	\$531,861	
2. Allow Engineering and Design Costs at 15%	1	Lump Sum	15%	\$265,931	
3. Adjust Construction Cost Escalation to MDC	1	Lump Sum	4.5%	\$79,779	Adjusted by CDM Estimating Dept. Allow 1.5 years @ 3%/year or 4.5% Escalation.
Total, Capital Cost Estimate Remedial Alternative 2C- Willow Site				= \$2,650,442	
				Rounded to: \$2,650,000	
				Three Year Present Value (7): - \$2,320,000	

See Notes on Page 6

Preliminary Cost Estimate
Sub-alternative 2C- Willow Boulevard

Consolidation/Containment of Select Materials,
Re-Grade/Stabilize Banks with Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site

GENERAL					
Maintenance	2	Event	\$10,000	\$20,000	Includes mowing and restoration of the site.
Repairs	75	Cubic Yard	\$15	\$1,125	Replace 1% of topsoil cover.
Monitoring	12	Lump Sum	\$1,504	\$18,048	One person, one 10-hour day/month
Groundwater Monitoring	4	Lump Sum	\$18,599	\$74,396	Quarterly Sampling of groundwater monitoring system. 4 events/year, one 2-person crew, 40 crew hours/event, 10 samples for complete TC analysis
Subtotal:				\$113,569	
15% Engineering(5):				\$17,035	
30% Contingency(6):				\$34,071	
Total:				\$164,675	
30-Year Present Worth Cost (7):				\$2,043,453	
Rounded Total:				\$2,040,000	
Willow Boulevard Branch Project Present Worth Cost: \$4,880,000					

Sub-alternative 2C - A-Site

Consolidation/Containment of Select Materials,
Re-Grade/Stabilize Banks using Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site

Item Description	Quantity	Unit	Unit Cost (\$)	Item Cost (\$)	Comments
Direct Costs:					
Mobilization/Demobilization	1	Lump Sum	2%	\$0	2% Mob/Demob Included in 10% Indirect Costs below
Site Preparation	17	Acre	\$6,925	\$117,725	Cost for clearing and grubbing.
Additional Groundwater Wells at A-Site	7	Each	\$5,000	\$35,000	Costs for installation of double-cased wells.
Mechanical Excavation	6,700	Cubic Yard	\$10	\$68,340	Includes excavating residuals east of Davis Creek and south of A-site Barn as necessary to construct cover system and relocating to stabilization area.
Confirmatory Sampling/Analysis	1	Lump Sum	\$10,000	\$10,000	In areas excavated as part of Item 4
Alternative Methods for Bank Stabilization					
a. Bank Regrading Loam/Topsoil	5,000	Cubic Yard	\$5.85	\$29,250	Includes regrading of Bank to 4H:1V slope. Loam/Topsoil.
b. Erosion Control -	1,700	Square Yard	\$5.65	\$9,605	Nylon, 3 dimensional geomatrix, 9 mil thick.
c. Eco-friendly planting	100,000	Square Feet	\$0.50	\$50,000	
d. Erosion Control	1,300	Linear Feet	\$5.65	\$7,345	Includes cost for rip-rap (6- to 8-inch stone), geotextile, and erosion control block.
Recontour Existing Grade	16,800	Cubic Yard	\$4.11	\$69,048	Re-Balance Site with 5 horizontal to 1 vertical slope
Part 115 Type III Cap					Based on 19.6 acres.
a. Filter Fabric	31,600	Square Yard	\$1.84	\$58,144	12 oz/sy Geotextile/Drainage Fabric (130 mil).
b. Gas Venting Layer	15,800	Cubic Yard	\$13.96	\$220,568	6-inch thickness. Sand, 6" lifts, on-site.
c. Flexible Membrane Liner	31,600	Square Yard	\$6.03	\$190,548	Fabric Membrane Liner/Bentonite Liner.
d. Drainage Layer	63,000	Cubic Yard	\$13.96	\$879,480	2-ft. thickness. Sand, 6" lifts, on-site.
e. Filter Fabric	31,600	Square Yard	\$2.81	\$88,796	12 oz/sy Geotextile/Drainage Fabric (130 mil).
f. Topsoil Layer	15,800	Cubic Yard	\$7.07	\$111,706	6-inch thickness.
g. Vegetative Cover	19.6	Acre	\$14,572	\$285,611	Restoration and creation of vegetative cover.
h. Gas Vents	20	Each	\$600	\$12,000	One per acre, 8", HDPE Elbow construction.
Stormwater Management System					
a. Sedimentation Basin	1	Lump Sum	\$30,000	\$30,000	Approximately 2 acres.
b. Pore Water Collection System	4,000	Linear Foot	\$9.60	\$38,400	Around perimeter of landfill, 6" diameter perforated PVC
c. Cover System Drainage Swales	4,500	Linear Foot	\$9.72	\$43,740	Grass-lined approximately 18-inches high with permanent erosion control mat.
d. Ditches (grass-lined)	10,000	Linear Foot	\$9.72	\$97,200	Approximately 18-inches deep by 9-feet wide and overlain with permanent erosion control mat.
e. Erosion control Mat	80,000	Square Foot	\$0.20	\$16,000	Assumed to be placed along upgradient access road side slopes and along the toe of the capped landfill side slopes.
f. Ditches (rip-rap lined)	800	Linear Foot	\$17.60	\$14,080	Approximately 18-inches deep by 12-feet wide and underlain with non-woven geotextile.
g. Downchutes	600	Linear Foot	\$30.00	\$18,000	Rip-rap filled Reno mattress placed within a 12-foot wide channel and underlain with geomembrane.
h. Culverts	400	Linear Feet	\$15.00	\$6,000	
Erosion Control at AMW-3A Area	1	Lump Sum	5000	5000	Installation of erosion control measures.
Restoration of Area East of Davis Creek					
a. Backfilling	3,800	Cubic Yard	\$7.62	\$28,956	Backfilling excavated area to pre-removal grade.
b. Vegetative Cover	7	Acre	\$14,572	\$102,004	Restoration and creation of vegetative cover of excavated area
Subtotal, Direct Costs:				\$2,642,546	

Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2C - A-Site**

**Consolidation/Containment of Select Materials,
Re-Grade/Stabilize Banks using Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site**

CAPITAL (DIRECT & INDIRECT)					
Item	Quantity	Units	Unit Cost (\$)	Item Cost (\$)	Comments
Indirect Construction Costs:					
1. Add Div 01 (General Conditions) and General Contractor's OH+P% Allow 10%	1	Lump Sum	10%	\$264,255	Adjusted by CDM Estimating Dept.
2. State Sales Tax - Assume project is Tax exempt	1	Lump Sum			Submitted by CDM Estimating Dept.
3. Allow for MBE/WBE/EEO Requirements Allow 1/2 of 1% of Direct Costs.	1	Lump Sum	1/2 of 1%	\$13,213	Adjusted by CDM Estimating Dept.
4. Adjust Labor Costs due to Health and Safety Levels of Protection	1	Lump Sum	5%	\$132,127	Adjusted by CDM Estimating Dept. Use EPA/COE Reference # 540-R-00-002 dated July 2000. Refer to Appendix B. Use 5% as adjustment. Costs = (5%) (3,213,841*40%)
5. Adjust Project Costs due to Local Area Cost Factors.	1	Lump Sum	1.076	\$200,834	Adjusted by CDM Estimating Dept. Use EPA/COE Reference # 540-R-00-002 dated July 2000. Refer to Appendix B. Use Means 2002 Michigan Factor of 1.076.
Subtotal, Indirect Construction Costs =				\$610,428	
Construction Cost Summary:					
	Subtotal, Direct, Indirect	Construction Costs =		\$3,252,974	
1. Add Contingency at 30%	1	Lump Sum	30%	\$975,892	
2. Allow Engineering and Design Costs at 15%	1	Lump Sum	15%	\$487,946	
3. Adjust Construction Cost Escalation to MDC	1	Lump Sum	4.5%	\$146,384	Adjusted by CDM Estimating Dept. Allow 1.5 years @ 3%/year or 4.5 Escalation.
Total, Capital Cost Estimate Remedial Alternative 2C A-Site				= \$4,863,197	
				Rounded to \$4,860,000	
				Three Year Present Value (7): \$4,250,000	

ANNUAL (POST-REMEDIAL) SITE CONTROL					
Item	Quantity	Units	Unit Cost (\$)	Item Cost (\$)	Comments
1. Cap Maintenance	2	Event	\$24,000	\$48,000	Includes mowing and restoration of the site.
2. Cap Repairs	180	Cubic Yard	\$15	\$2,700	Replace 1% of topsoil cover.
3. Gas Monitoring	12	Lump Sum	\$1,504	\$18,048	Monitoring of the gas monitoring system.
4. Groundwater Monitoring	4	Lump Sum	\$23,299	\$93,196	Quarterly Sampling of groundwater monitoring system. 4 events/year, one 2-person crew, 40 crew hours/event, 15 samples for complete TC analysis
Subtotal:				\$161,944	
15% Engineering(5):				\$24,292	
30% Contingency(6):				\$48,583	
Total:				\$234,819	
30-Year Present Worth Cost (7):				\$2,913,866	
Rounded Total:				\$2,910,000	
A-Site Total Project Present Worth Cost:				\$7,160,000	

See Notes on Page 6

Preliminary Cost Estimate
Sub-alternative 2C - A-Site

Consolidation/Containment of Select Materials,
Re-Grade/Stablize Banks using Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site

TOTAL COST	
WILLOW BOULEVARD SITE TOTAL PROJECT PRESENT WORTH COST:	\$4,360,000
A-SITE TOTAL PROJECT PRESENT WORTH COST:	\$7,150,000
SUB-ALTERNATIVE 2C TOTAL PROJECT PRESENT WORTH COST:	\$11,510,000

Notes:

1. Unit cost shown includes material and labor costs unless otherwise noted.
2. Costs estimated based on similar project experience and R.S. Means Company 2001a; 2001b.
4. Cap repairs and maintenance will be implemented as necessary every year for a period of 30 years.
5. A 15% contingency is included to account for engineering fees. Contingency does not include legal fees and permit acquisition. Engineering Contingency developed based upon USEPA, 1987.
6. A 30% contingency is included provide for unexpected circumstances or variability in estimate areas, volumes, labor and material costs. Contingency allowance developed based upon USEPA, 1987.
7. 30-year present worth based on a 7.0 percent discount rate as published in USEPA, 1993c, and has been applied to Annual/O&M Costs
Project fixed costs will be spread out over 3 years, with present worth based on a 7% discount rate as published in USEPA, 1993c, and has been applied to all other costs.
8. Refer to Table 7-1 for cpst development.

Removal of all OU2 Residual/Material and Off-Site Disposal

CAPITAL (DIRECT & INDIRECT)					
Item	Quantity	Units	Unit Cost \$(1,2)	Item Cost (\$)	Comments
Direct Costs:					
1. Mobilization/Demobilization	1	Lump Sum	2%	\$0	2% Mob/Damob Included in 10% Indirect Costs Below
2. Site Preparation	34	Acres	\$6,925	\$235,450	Cost for clearing and grubbing.
3. Work Area Isolation	26,000	Square Feet	\$13.70	\$356,200	Includes cost for driving sheet piling to allow for excavation adjacent to Kalamazoo River to isolate river flow around the project area, and extract sheeting upon project completion
4. Mechanical Excavation/Dredge					
a. Unsaturated	542,000	Cubic Yard	\$7.50	\$4,065,000	Cost is for excavation only. Handling/Staging is a separate line item
b. Saturated	92,000	Cubic Yard	\$20	\$1,840,000	Costs include relocating saturated materials to stabilization area.
5. Residuals Stabilization					
a. Flexible Membrane Liner	1,200	Square Yard	\$5.40	\$6,480	Assumes 0.25-acre mixing area.
b. Lime and mixing	92,000	Cubic Yard	\$15	\$1,380,000	Fly Ash (Class F), bulk delivered, mixing at 1:1, and equipment to mix.
6. Handling/Staging of Residuals	726,000	Cubic Yard	\$5	\$3,630,000	
7. Water Treatment	415,296,000	gallons	\$0.01	\$4,152,960	Costs for treatment (sand filtration and carbon adsorption) of water from residuals approximately 126,720,000 gallons of water from the Willow Boulevard Site (assumes 2,000 gpm for 44 days) and approximately 288,576,000 gallons of water from A-Site (assumes 1,200 gpm for 153 days).
8. Residuals Transport and Disposal	726,000	Cubic Yard	\$25	\$18,150,000	Assumes material can be disposed of as non-TSCA, but regulated material
9. Confirmatory Sampling/Analysis	1	Lump Sum	\$50,000	\$50,000	In areas excavated as part of this remedial alternative
10. Backfilling and Regrading	190,000	Cubic Yard	\$7.62	\$1,447,800	Assumes 30% of removed material.
11. Restoration of Areas	34	Acres	\$14,572	\$495,448	Vegetation and landscaping for both areas.
			Subtotal, Direct Costs:	\$35,809,338	
Indirect Construction Costs:					
1. Add Div 01 (General Conditions) and General Contractor's OH+P% Allow 10%	1	Lump Sum	10%	\$1,765,933	Adjusted by CDM Estimating Dept. Use 1070 (35,809,338 - 18,150,000)
2. State Sales Tax- Assume project is Tax Exempt	1	Lump Sum			Submitted by CDM Estimating Dept.
3. Allow for MBE/WBE/EEO Requirements Allow 1/2 of 1% of Direct Costs	1	Lump Sum	1/2 of 1%	\$88,297	Adjusted by CDM Estimating Dept. Use (.005) (35,809,338 - 18,150,000)
4. Adjust Labor Costs due to Health and Safety Levels of Protection	1	Lump Sum	5%	\$353,187	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2002. Refer to Appendix B. Use 5% as adjustment. Costs = (\$5M) (\$17,659,338 * 40%)
5. Adjust Project Costs due to Local Area Cost Factors	1	Lump Sum	1.076	\$2,721,510	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2002. Refer to Appendix B. Use Means 2002 Michigan Factor of 1.076.
			Subtotal Indirect Construction Costs=	\$4,928,927	
Construction Cost Summary:					
			Subtotal, Direct, Indirect Construction Costs=	\$40,738,265	
6. Add Contingency at 30%	1	Lump Sum	30%	\$8,776,480	Use 30% (\$40,738,265 - \$18,150,000)
7. Allow Engineering and Design Costs at 15%	1	Lump Sum	15%	\$3,388,240	Use 15% (\$40,738,265 - \$18,150,000)
8. Adjust Construction Cost Escalation to MDC	1	Lump Sum	4.5%	\$1,833,222	Adjusted by CDM Estimating Dept. Allow 1.5 years @ 3%/year or 4.5 Escalation
Total, Capital Cost Estimate Remedial Alternative #3				\$52,736,207	
			Rounded to	\$52,740,000	
			Three Year Present Value (5):	\$46,140,000	

Notes:

- Unit cost shown includes material and labor costs unless otherwise noted.
- Costs estimated based on similar project experience and R.S. Means Company 2001a, 2001b. A 15% contingency is included to account for engineering fees, and does not include legal fees or permit acquisition.
- Engineering Contingency developed based upon USEPA, 1987. A 30% contingency is included to provide for unexpected circumstances or variability in estimate areas, volumes, labor and material costs.
- Contingency allowance is included to provide for unexpected circumstances or variability in estimate areas, volumes, labor and material costs.
- At the request of EPA, project fixed costs will be spread out over 3 years, with present worth based on a 7% discount rate as published in USEPA, 1993c, and has been applied to all costs.

TABLE 7-3

Preliminary Cost Estimate Alternative 4

Removal of Willow Boulevard Residuals and Consolidation at A-Site

Item	Quantity	Unit	Unit Cost (\$)	Total Cost (\$)	Comments
Direct Costs:					
1. Mobilization/Demobilization	1	Lump Sum	2%	\$0	2% Mob/Demob Included in 10% Indirect Costs below
2. A-Site Preparation	17	Acre	\$6,925	\$117,725	Cost for clearing/chip trees (<12" diameter) and grubbing stumps.
3. Installation of Additional GW Wells at A-Site	7	Each	\$5,000	\$35,000	Costs for installation of double-cased wells.
4. Temporary Sheetpiling Installation	1,800	Linear Foot	\$305	\$549,000	Temporary installation between Kalamazoo River and Willow Blvd. Site 15' deep, drive, extract & salva
5. Erosion Control					
a. Silt Curtain	300	Linear Foot	\$15	\$4,500	
b. Silt Fencing	1,500	Linear Foot	\$1	\$1,500	Assume installation in difficult conditions.
6. Recontour A-Site Existing Grade	16,800	Cubic Yard	\$4.11	\$69,048	20 acres, varied thickness.
7. Mechanical Excavation/Dredge Willow Site					
a. Unsaturated	134,100	Cubic Yard	\$7.50	\$1,005,750	Cost is for excavation only, staging is a separate line item.
b. Saturated	18,000	Cubic Yard	\$20.00	\$360,000	Costs include relocating saturated materials to stabilization area.
8. Water Treatment	126,720,000	gallons	\$0.01	\$1,267,200	Treating (sand filtration & carbon adsorption) water from residuals; est. 126,720,000 gallons (2,000 gpr days at \$0.0216 per gallon). Modified by CDM to reflect \$10/1000 gallons treated.
9. Saturated Residuals Stabilization					
a. Flexible Membrane Liner	1,200	Square Yard	\$20.00	\$24,000	Cost for 0.25 acre stabilization area.
b. Fly Ash	18,000	Cubic Yard	\$15	\$270,000	Fly Ash (Class F), bulk delivered, mixing at 1:1, and equipment to mix.
10. Relocation of Residuals	170,100	Cubic Yard	\$2.27	\$386,127	Relocation to cap area, 34 cy off-road dump.
11. Residual Placement and Compaction at A-Site	170,100	Cubic Yard	\$1.81	\$307,881	Sheepsfoot roller 4 passes
12. Part 115 Type III Cap Over A-Site					
a. Filter Fabric	42,400	Square Yard	\$1.84	\$78,016	12 oz/sy Geotextile/Drainage Fabric (130 mil).
b. Gas Venting Layer	22,100	Cubic Yard	\$13.96	\$308,516	6-inch thickness. Sand, 6" lifts, on-site.
c. Flexible Membrane Liner	42,400	Square Yard	\$6.03	\$255,672	Fabric Membrane Liner/Bentonite Liner.
d. Drainage Layer	88,500	Cubic Yard	\$13.96	\$1,235,460	2-ft. thickness. Sand, 6" lifts, on-site.
e. Filter Fabric	42,400	Square Yard	\$2.81	\$119,144	12 oz/sy Geotextile/Drainage Fabric (130 mil).
f. Topsoil Layer	22,100	Cubic Yard	\$7.07	\$156,247	6-inch thickness.
g. Vegetative Cover	23.0	Acre	\$14,572	\$335,156	Restoration and creation of vegetative cover.
h. Gas Vents	24	Each	\$600	\$14,400	One per acre, 8", HDPE Elbow construction.
i. Anchor Trench	4,607	Linear Feet	\$3	\$13,821	

**Preliminary Cost Estimate
Alternative 4**

**Removal of Willow Boulevard Residuals and
Consolidation at A-Site**

					Comments
13. Stormwater Management System					
a. Sedimentation Basin	1	Lump Sum	\$30,000	\$30,000	Approximately 2 acres.
b. Pore Water Collection System	4,000	Linear Foot	\$9.60	\$38,400	Around perimeter of landfill, 6" diameter perforated PVC
c. Cover System Drainage Swales	6,300	Linear Foot	\$9.72	\$61,236	Grass-lined approximately 18" high with permanent erosion control mat
d. Ditches (grate-lined)	11,000	Linear Foot	\$9.72	\$106,920	Approximately 18-inches deep by 9-feet wide and overlain with permanent erosion control mat.
e. Erosion control Mat	120,000	Square Foot	\$0.65	\$78,000	Assumed to be placed along upgradient access road side slopes and along the toe of the capped landfill side slopes.
f. Ditches (rip-rap lined)	1,000	Linear Foot	\$17.60	\$17,600	Approximately 18-inches deep by 12-feet wide and underlain with non-woven geotextile.
g. Downchutes	800	Linear Foot	\$30.00	\$24,000	Rip-rap filled reno mattress placed within a 12-foot wide channel and underlain with geomembrane.
h. Culverts	600	Linear Feet	\$15.40	\$9,240	
14. Restoration of Willow Boulevard					
Excavation Area					
a. Backfilling below groundwater table	18,000	Cubic Yard	\$7.62	\$137,160	Backfilling approximately 2 feet of material in the excavated area.
b. Vegetative Cover	7	Acre	\$14,572	\$102,004	Restoration and creation of vegetative cover of excavated areas.
c. New Riverbank Construction	1,800	Linear Feet	\$35	\$63,000	Restoration along bank of former Willow Boulevard Site.
15. Site Restoration	1	Lump Sum	\$50,000	\$50,000	Off-cap disturbed area restoration.
16. Additional Excavation					
a. Temporary Access Road East of Davis Creek	1	Lump Sum	\$100,000	\$100,000	
b. Residual Relocation East of Davis Creek	3,800	Cubic Yard	\$2.27	\$8,626	
c. Excavation/Backfill East of Davis Creek	3,800	Cubic Yard	\$15	\$57,000	
d. Residual Relocation South of A-Site	2,900	Cubic Yard	\$2.27	\$6,583	
e. Excavation/Backfill South of A-Site	2,900	Cubic Yard	\$15.00	\$43,500	
f. Water Treatment	1	Lump Sum	\$50,000	\$50,000	
g. Confirmatory Sampling/Analysis	1	Lump Sum	\$10,000	\$10,000	In areas excavated as part of Item 16
Subtotal Direct Costs				\$7,907,432	

**Preliminary Cost Estimate
Alternative 4**

**Removal of Willow Boulevard Residuals and
Consolidation at A-Site**

CAPITAL (DIRECT & INDIRECT) continued					
Item	Quantity	Units	Unit Cost (\$)	Item Cost (\$)	Comments
Indirect Costs:					
1. Add Div 01 (General Conditions) and General Contractor's OH+P% -Allow 10%	1	Lump Sum	10%	\$799,743	Adjusted by CDM Estimating Dept.
2. State Sales Tax - Assume project is Tax exempt	1	Lump Sum			Submitted by CDM Estimating Dept.
3. Allow for MBE/WBE/EEO Requirements. Allow for 1/2 of 1% of Direct Costs	1	Lump Sum	1/2 of 1%	\$39,537	Adjustment by CDM Estimating Dept.
4. Adjust Labor Costs due to Health and Safety Levels of Protection	1	Lump Sum	5%	\$158,149	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000. Refer to Appendix B. Use 5% as adjustment. Cost = (5%) (\$9,377,384 * 40%)
5. Adjust Project Costs due to Local Area Cost Factors	1	Lump Sum	1.076	\$600,965	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000. Refer to Appendix B. Use Means 2002 Michigan Factor of 1.076
Subtotal, Indirect Construction Costs =				\$1,598,394	

Construction Cost Summary:		Subtotal, Direct, and Indirect Construction Costs =	\$9,505,826	Adjusted by CDM Estimating Dept. Allow 1.5 years @ 3%/year or 4.5 Escalation.
1. Add Contingency at 30%	1	Lump Sum 30%	\$2,851,748	
2. Allow Engineering and Design Costs at 15%	1	Lump Sum 15%	\$1,425,874	
3. Adjust Construction Cost Escalation to MDC	1	Lump Sum 4.5%	\$427,762	
Total, Capital Cost Estimate, Remedial Alternative #4		=	\$14,211,210	
		Rounded To	\$14,210,000	
		Three Year Present Value (7):	\$12,860,000	

ANNUAL MAINTENANCE (POST-REMEDIAL SITE CONTROL)					
Item	Quantity	Units	Unit Cost (\$)	Item Cost (\$)	Comments
1. Cap Maintenance	2	Event	\$24,000	\$48,000	Includes mowing and restoration of the site.
2. Cap Repairs	221	Cubic Yard	\$15	\$3,315	Replace 1% of topsoil cover.
3. Gas Monitoring	12	Lump Sum	\$1,504	\$18,048	One person, one 10-hour day/month
4. Groundwater Monitoring	4	Lump Sum	\$23,299	\$93,196	Quarterly Sampling of groundwater monitoring system. 4 events/year, one 2-person crew, 40 crew hours/event, 10 samples for complete TC analysis
Subtotal:				\$162,559	
15% Engineering:				\$24,384	
30% Contingency:				\$48,768	
Total:				\$235,711	
30-Year Present Worth Cost (7):				\$2,924,932	
Rounded Total:				\$2,920,000	

Alternative 4 - TOTAL PROJECT PRESENT WORTH COST: \$15,780,000

Attachment 2

Attachment 2

Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site

Preliminary Cost Estimate
Sub-alternative 2C - Willow Boulevard

Consolidation/Containment of Select Materials,
Re-Grade/Stabilize Banks using Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site

Direct Costs					
1. Mobilization/Demobilization	1	Lump Sum	2%	\$0	2% Mob/Demob Included in 10% Indirect Costs below.
2. Installation of Additional Groundwater Wells at Willow Boulevard	5	Each	\$5,000	\$25,000	Costs for installation of double-cased wells.
3. Mechanical Excavation	5,000	Cubic Yard	\$2.24	\$11,200	Costs for excavation of drainageway as necessary to construct cover system. Doubled standard excavation cost.
4. Alternative Methods for Bank Stabilization					
a. Bank Regrading Loam/Topsoil	3,000	Cubic Yard	\$5.85	\$17,550	Includes regrading of Bank to 4H:1V slope. Loam/Topsoil.
b. Erosion Control	12,000	Square Yard	\$5.65	\$67,800	Nylon, 3 dimensional geomatrix, 9 mil thick.
c. Eco-friendly planting	324,000	Square Feet	\$0.50	\$162,000	
d. Water Treatment	1,000,000	gallons	\$0.10	\$100,000	Cost for treating (sand filtration/carbon adsorption) water infiltrating excavation (3 feet deep by 50 feet long) in the event that residual materials are found during the Setback process, assumes 50,000 gpd, for 20 days.
5. Recontour Existing Grade	93,236	Cubic Yard	\$4.11	\$383,200	Re-Balance Site with 4 horizontal to 1 vertical slope
6. Part 113 Type III Cap					Based on 7.6 acres.
a. Filter Fabric	12,300	Square Yard	\$1.84	\$22,632	12 oz/sy Geotextile/Drainage Fabric (130 mil).
b. Gas Venting Layer	6,100	Cubic Yard	\$13.96	\$85,156	6-inch thickness. Sand, 6" lifts, on-site.
c. Flexible Membrane Liner	12,300	Square Yard	\$6.03	\$74,169	Fabric Membrane Liner/Bentonite Liner.
d. Drainage Layer	24,500	Cubic Yard	\$13.96	\$342,020	2-ft. thickness. Sand, 6" lifts, on-site.
e. Filter Fabric	12,300	Square Yard	\$2.81	\$34,563	12 oz/sy Geotextile/Drainage Fabric (130 mil).
f. Topsoil Layer	6,100	Cubic Yard	\$7.07	\$43,127	6-inch thickness.
g. Vegetative Cover	7.6	Acre	\$14,572.00	\$110,747	Restoration and creation of vegetative cover.
h. Gas Vents	8	Each	\$600.00	\$4,800	One per acre, 8", HDPE Elbow construction.
7. Stormwater Management System					
a. Sedimentation Basin	1	Lump Sum	\$15,000.00	\$15,000	Approximately 0.5 acres.
b. Pore Water Collection System	2,500	Linear Foot	\$9.60	\$24,000	Around perimeter of landfill, 6" diameter perforated PVC
c. Cover System Drainage Swales	1,500	Linear Foot	\$9.72	\$14,580	Grass lined approximately 18" high with permanent erosion control mat
d. Ditches (grass-lined)	4,000	Linear Foot	\$9.72	\$38,880	Approximately 18-inches deep by 9-feet wide and overlain with permanent erosion control mat.
e. Erosion control Mat	50,000	Square Foot	\$0.65	\$32,500	Assumed to be placed along upgradient access road side slopes and along the toe of the capped landfill side slopes.
f. Ditches (rip-rap lined)	800	Linear Foot	\$17.60	\$14,080	Approximately 18-inches deep by 12-feet wide and underlain with non-woven geotextile.
g. Downchutes	300	Linear Foot	\$30.00	\$9,000	Rip-rap filled reno mattress placed within a 12-foot wide channel and underlain with geomembrane.
h. Culverts	400	Linear Feet	\$15.40	\$6,160	
Subtotal, Direct Costs:				\$1,638,164	

See Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2C - Willow Boulevard**

**Consolidation/Containment of Select Materials,
Re-Grade/Stabilize Banks using Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site**

Item Description					
Indirect Construction Costs:					
1. Add Div 01 (General Conditions) and General Contractor's OH+P % Allow 10%	1	Lump Sum	10%	\$147,616	Adjusted by CDM Estimating Dept.
2. State Sales Tax- Addume project is tax exempt	1	Lump Sum			Submitted by CDM Estimating Dept.
3. Allow for MBE/WBE/EEO Requirements Allow 1/2 of 1% of Direct Costs.	1	Lump Sum	1/2 of 1%	\$7,380	Adjusted by CDM Estimating Dept.
4. Adjust Labor Costs due to Health and Safety Levels of Protection	1	Lump Sum	5%	\$29,523	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000. Refer to Appendix B. Use 5% as adjustment. Costs = (5%) (\$1,476,164 *40%)
5. Adjust Project Costs due to Local Area Cost Factors	1	Lump Sum	1.076	\$112,188	Adjusted by CDM Estimating Dept. Use EPA/COE Reference #540-R-00-002 dated July 2000. Refer to Appendix B. Use Means 2002 Michigan Factor of 1%
Subtotal, Indirect Construction Costs=				\$296,707	
Construction Cost Summary:					
Subtotal Direct, and Indirect Construction Costs =				\$1,77,871	
1. Add Contingency at 30%	1	Lump Sum	30%	\$531,861	
2. Allow Engineering and Design Costs at 15%	1	Lump Sum	15%	\$265,931	
3. Adjust Construction Cost Escalation to MDC	1	Lump Sum	4.5%	\$79,779	Adjusted by CDM Estimating Dept. Allow 1.5 years @ 3%/year or 4.5% Escalation.
Total, Capital Cost Estimate Remedial Alternative 2C- Willow Site				= \$2,650,442	
			Rounded to:	\$2,650,000	
			Three Year Present Value (7):	\$2,320,000	

See Notes on Page 6

Preliminary Cost Estimate
Sub-alternative 2C- Willow Boulevard

Consolidation/Containment of Select Materials,
Re-Grade/Stabilize Banks with Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site

Preliminary Cost Estimate					
Sub-alternative 2C- Willow Boulevard					
1. Cap Maintenance	2	Event	\$10,000	\$20,000	Includes mowing and restoration of the site.
2. Cap Repairs	75	Cubic Yard	\$15	\$1,125	Replace 1% of topsoil cover.
3. Gas Monitoring	12	Lump Sum	\$1,504	\$18,048	One person, one 10-hour day/month
4. Groundwater Monitoring	4	Lump Sum	\$18,599	\$74,396	Quarterly Sampling of groundwater monitoring system. 4 events/year, one 2-person crew, 40 crew hours/event, 10 samples for complete TC analysis
Subtotal:				\$113,569	
15% Engineering(5):				\$17,035	
30% Contingency(6):				\$34,071	
Total:				\$164,675	
30-Year Present Worth Cost (7):				\$2,043,453	
Total Project Present Worth Cost:				\$2,043,453	
Willow Boulevard Station Total Project Present Worth Cost: \$2,043,453					

See Notes on Page 6

Preliminary Cost Estimate
Sub-alternative 2C - A-Site

Consolidation/Containment of Select Materials,
Re-Grade/Stabilize Banks using Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site

Item	Quantity	Unit	Unit Cost (\$)	Item Cost (\$)	Comments
Direct Costs:					
1. Mobilization/Demobilization	1	Lump Sum	2%	\$0	2% Mob/Demob Included in 10% Indirect Costs below
2. Site Preparation	17	Acre	\$6,925	\$117,725	Cost for clearing and grubbing.
3. Additional Groundwater Wells at A-Site	7	Each	\$5,000	\$35,000	Costs for installation of double-cased wells.
4. Mechanical Excavation	6,700	Cubic Yard	\$10	\$68,340	Includes excavating residuals east of Davis Creek and south of A-site Bern as necessary to construct cover system and relocating to stabilization area.
5. Confirmatory Sampling/Analysis	1	Lump Sum	\$10,000	\$10,000	In areas excavated as part of Item 4
4. Alternative Methods for Bank Stabilization					
a. Bank Regrading Loam/Topsoil	5,000	Cubic Yard	\$5.85	\$29,250	Includes regrading of Bank to 4H:1V slope. Loam/Topsoil.
b. Erosion Control	1,700	Square Yard	\$5.65	\$9,605	Nylon, 3 dimensional geomatrix, 9 mil thick.
c. Eco-friendly planting	100,000	Square Feet	\$0.50	\$50,000	
d. Erosion Control	1,300	Linear Feet	\$5.65	\$7,345	Includes cost for rip-rap (6- to 8-inch stone), geotextile, and erosion control block
5. Recontour Existing Grade	16,800	Cubic Yard	\$4.11	\$69,048	Re-Balance Site with 5 horizontal to 1 vertical slope
6. Part 115 Type III Cap					Based on 19.6 acres.
a. Filter Fabric	31,600	Square Yard	\$1.84	\$58,144	12 oz/sy Geotextile/Drainage Fabric (130 mil).
b. Gas Venting Layer	15,800	Cubic Yard	\$13.96	\$220,568	6-inch thickness. Sand, 6" lifts, on-site.
c. Flexible Membrane Liner	31,600	Square Yard	\$6.03	\$190,548	Fabric Membrane Liner/Bentonite Liner.
d. Drainage Layer	63,000	Cubic Yard	\$13.96	\$879,480	2-ft. thickness. Sand, 6" lifts, on-site.
e. Filter Fabric	31,600	Square Yard	\$2.81	\$88,796	12 oz/sy Geotextile/Drainage Fabric (130 mil).
f. Topsoil Layer	15,800	Cubic Yard	\$7.07	\$111,706	6-inch thickness.
g. Vegetative Cover	19.6	Acre	\$14,572	\$285,611	Restoration and creation of vegetative cover.
h. Gas Vents	20	Each	\$600	\$12,000	One per acre, 8", HDPE Elbow construction.
7. Stormwater Management System					
a. Sedimentation Basin	1	Lump Sum	\$30,000	\$30,000	Approximately 2 acres.
b. Pore Water Collection System	4,000	Linear Foot	\$9.60	\$38,400	Around perimeter of landfill, 6" diameter perforated PVC
c. Cover System Drainage Swales	4,500	Linear Foot	\$9.72	\$43,740	Grass-lined approximately 18-inches high with permanent erosion control mat.
d. Ditches (grass-lined)	10,000	Linear Foot	\$9.72	\$97,200	Approximately 18-inches deep by 9-feet wide and overlain with permanent erosion control mat.
e. Erosion control Mat	80,000	Square Foot	\$0.20	\$16,000	Assumed to be placed along upgradient access road side slopes and along the toe of the capped landfill side slopes.
f. Ditches (rip-rap lined)	800	Linear Foot	\$17.60	\$14,080	Approximately 18-inches deep by 12-feet wide and underlain with non-woven geotextile.
g. Downchutes	600	Linear Foot	\$30.00	\$18,000	Rip-rap filled Reno mattress placed within a 12-foot wide channel and underlain with geomembrane.
h. Culverts	400	Linear Feet	\$15.00	\$6,000	
8. Erosion Control at AMW-3A Area	1	Lump Sum	5000	5000	Installation of erosion control measures.
9. Restoration of Area East of Davis Creek					
a. Backfilling	3,800	Cubic Yard	\$7.62	\$28,956	Backfilling excavated area to pre-removal grade.
b. Vegetative Cover	7	Acre	\$14,572	\$102,004	Restoration and creation of vegetative cover of excavated area
Subtotal, Direct Costs:				\$2,642,546	

See Notes on Page 6

**Preliminary Cost Estimate
Sub-alternative 2C - A-Site**

**Consolidation/Containment of Select Materials,
Re-Grade/Stabilize Banks using Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site**

					Comments
Indirect Construction Costs:					
1. Add Div 01 (General Conditions) and General Contractor's OH+P% Allow 10%	1	Lump Sum	10%	\$264,255	Adjusted by CDM Estimating Dept.
2. State Sales Tax - Assume project is Tax exempt	1	Lump Sum			Submitted by CDM Estimating Dept.
3. Allow for MBE/WBE/EEO Requirements Allow 1/2 of 1% of Direct Costs.	1	Lump Sum	1/2 of 1%	\$13,213	Adjusted by CDM Estimating Dept.
4. Adjust Labor Costs due to Health and Safety Levels of Protection	1	Lump Sum	5%	\$132,127	Adjusted by CDM Estimating Dept. Use EPA/COE Reference # 540-R-00-002 dated July 2000. Refer to Appendix B. Use 5% as adjustment. Costs = (5%) (3,213,841*40%)
5. Adjust Project Costs due to Local Area Cost Factors.	1	Lump Sum	1.076	\$200,834	Adjusted by CDM Estimating Dept. Use EPA/COE Reference # 540-R-00-002 dated July 2000. Refer to Appendix B. Use Means 2002 Michigan Factor of 1.076.
Subtotal, Indirect Construction Costs =				\$610,428	
Construction Cost Summary:					
	Subtotal, Direct, Indirect	Construction Costs =		\$3,252,974	
1. Add Contingency at 30%	1	Lump Sum	30%	\$975,892	
2. Allow Engineering and Design Costs at 15%	1	Lump Sum	15%	\$487,946	
3. Adjust Construction Cost Escalation to MDC	1	Lump Sum	4.5%	\$146,384	Adjusted by CDM Estimating Dept. Allow 1.5 years @ 3%/year or 4.5 Escalation.
Total, Capital Cost Estimate Remedial Alternative 2C A-Site				= \$4,863,197	
				Rounded to \$4,860,000	
				Three Year Present Value (7): \$4,250,000	
1. Cap Maintenance	2	Event	\$24,000	\$48,000	Includes mowing and restoration of the site.
2. Cap Repairs	180	Cubic Yard	\$15	\$2,700	Replace 1% of topsoil cover.
3. Gas Monitoring	12	Lump Sum	\$1,504	\$18,048	Monitoring of the gas monitoring system.
4. Groundwater Monitoring	4	Lump Sum	\$23,299	\$93,196	Quarterly Sampling of groundwater monitoring system. 4 events/year, one 2-person crew, 40 crew hours/event, 15 samples for complete TC analysis
Subtotal:				\$161,944	
15% Engineering(5):				\$24,292	
30% Contingency(6):				\$48,583	
Total:				\$234,819	
30-Year Present Worth Cost (7):				\$2,913,866	

See Notes on Page 6

Preliminary Cost Estimate
Sub-alternative 2C - A-Site

Consolidation/Containment of Select Materials,
Re-Grade/Stablize Banks using Ecofriendly Materials
with a Setback at Willow Boulevard, Retain Existing
Sheet Piling at A-Site

WILLOW BOULEVARD SITE TOTAL PROJECT PRESENT WORTH COST:		\$4,360,000
A-SITE TOTAL PROJECT PRESENT WORTH COST:		\$7,150,000
SUB-ALTERNATIVE TOTAL PROJECT PRESENT WORTH COST:		\$11,510,000

1. Unit cost shown includes material and labor costs unless otherwise noted.
2. Costs estimated based on similar project experience and R.S. Means Company 2001a; 2001b.
4. Cap repairs and maintenance will be implemented as necessary every year for a period of 30 years.
5. A 15% contingency is included to account for engineering fees. Contingency does not include legal fees and permit acquisition. Engineering Contingency developed based upon USEPA, 1987.
6. A 30% contingency is included provide for unexpected circumstances or variability in estimate areas, volumes, labor and material costs. Contingency allowance developed based upon USEPA, 1987.
7. 30-year present worth based on a 7.0 percent discount rate as published in USEPA, 1993c, and has been applied to Annual/O&M Costs
Project fixed costs will be spread out over 3 years, with present worth based on a 7% discount rate as published in USEPA, 1993c, and has been applied to all other costs.
8. Refer to Table 7-1 for cpst development.

APPENDIX A

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION**

**ADMINISTRATIVE RECORD
WILLOW BOULEVARD/A-SITE OPERABLE UNIT 2
OF THE
ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER SITE
KALAMAZOO, MICHIGAN**

**UPDATE #1
SEPTEMBER 26, 2006**

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	10/00/88	U.S. EPA/ OERR	U.S. EPA	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (INTERIM FINAL) [EPA/540/G-89/004]	
2	10/26/88	Lee, C., U.S. EPA	Harris, V., MDNR	Letter re: Remedial Action Proposal from Georgia-Pacific to Contain PCB Contaminated Residual Wastes w/ Attachment	3
3	07/00/99	U.S. EPA/ OSWER	EPA	A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (EPA 540-R-98-031)	
4	01/30/04	von Gunten, B., MDEQ	Brown, M., Blasland, Bouck & Lee, Inc.	Letter re: Response to BBL Comment on Final Remedial Investigation/ Feasibility Study Report for the Willow Boulevard/ A-Site (Operable Unit 2) of the Allied Paper/ Portage Creek/Kalamazoo River Site	9
5	11/00/04	Blasland, Bouck & Lee, Inc.	U.S. EPA	Remedial Investigation/ Focused Feasibility Study for the Willow Boulevard/ A-Site Operable Unit: Volume 1 of 4 (Text, Tables and Figures)	321
6	11/00/04	Blasland, Bouck & Lee, Inc.	U.S. EPA	Remedial Investigation/ Focused Feasibility Study for the Willow Boulevard/ A-Site Operable Unit: Volume 2 of 4 (Appendices A-E)	464
7	11/00/04	Blasland, Bouck & Lee, Inc.	U.S. EPA	Remedial Investigation/ Focused Feasibility Study for the Willow Boulevard/ A-Site Operable Unit: Volume 3 of 4 (Appendices F-H)	511

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
8	11/00/04	Blasland, Bouck & Lee, Inc.	U.S. EPA	Remedial Investigation/ Focused Feasibility Study for the Willow Boulevard/ A-Site Operable Unit: Volume 4 of 4 (Appendices I-P)	482
9	12/10/04	Hogarth, A., MDEQ	Interested Parties	Memorandum re: RRD Oper- ational Memorandum No. 1	46
10	06/24/05	MDEQ	File	Footnotes for the Part 201 Criteria/Part 213 Risk-Based Screening Levels RRD Operational Memorandum No. 1	11
11	08/03/05	Great Lakes Shorthand	U.S. EPA	Transcript: Public Hearing for the Willow Boulevard/ A-Site Operable Unit	27
12	08/03/05	U.S. EPA	File	Commenter Registration Sheets for August 3, 2005 Public Hearing for the Allied Paper/Portage Creek/ Kalamazoo River Site	4
13	08/05/05	Chase, K., Kalamazoo Environmental Council	Karl, R., U.S. EPA	E-Mail Transmission re: KEC Request for an Extension to the Public Comment Period for the Willow Boulevard/ A-Site Operable Unit	1
14	08/11/05	U.S. EPA	Public	Public Notice: Extension of Public Comment Period to September 16, 2005 for the Willow Boulevard/A-Site Landfill Cleanup Project	2
15	08/11/05	de Blasio, D., U.S. EPA	Addressees	Cover Letter Forwarding Materials Related to the Proposed Plan for the Willow Boulevard/A-Site Operable Unit	2
16	08/19/05	Gapp, J., MDEQ	Kolak, S., U.S. EPA	Letter re: MDEQ Comments on the Proposed Cleanup Plan for the Willow Boulevard/A-Site Landfills	3
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